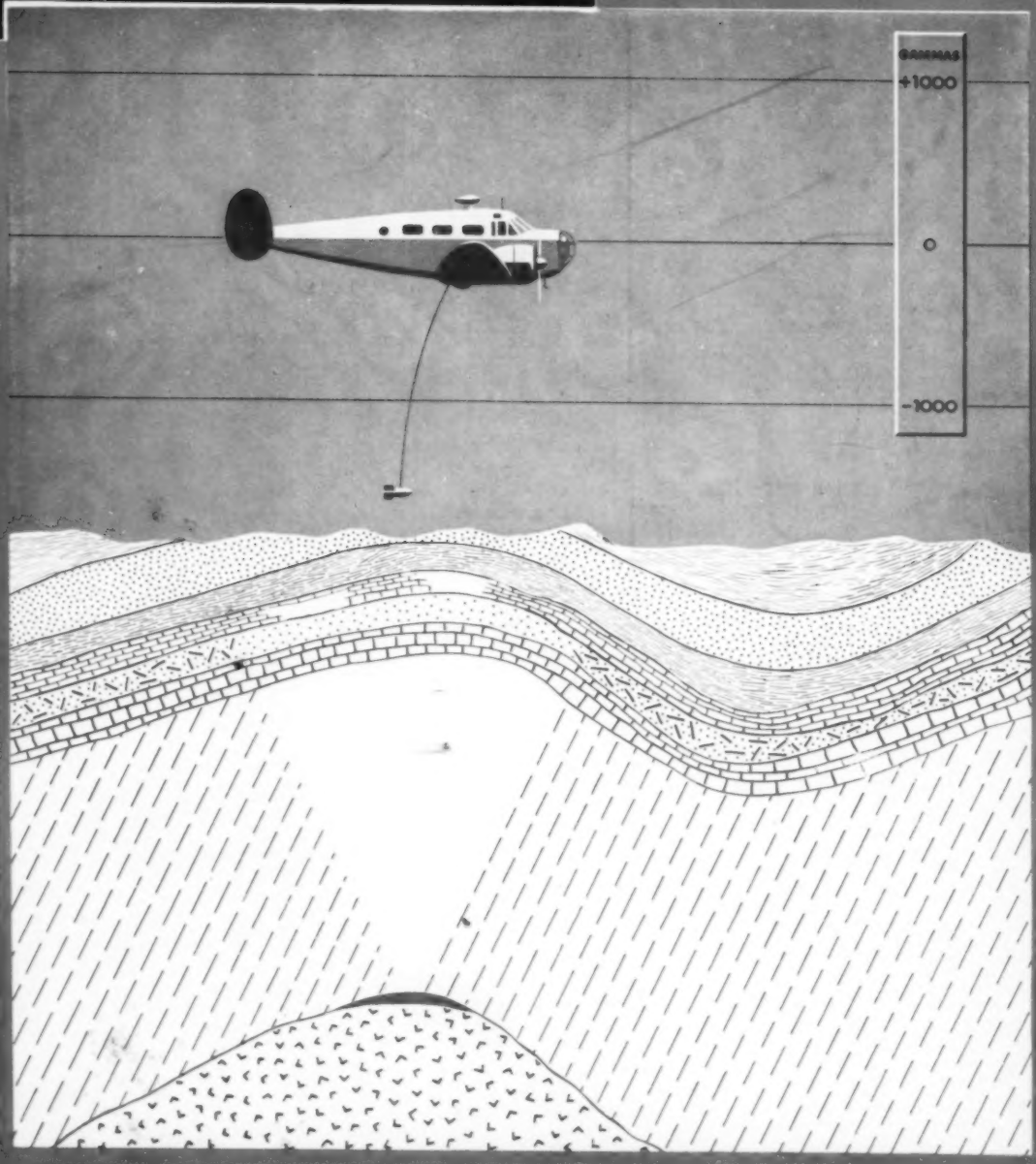
AUGUST 1955 VOL. 17, NO. 9

MINING WORLD

How To Mine Low-grade Tungsten at a Profit

Claim Locater's Rights Under New Mining Law



Do Magnetic Lows Indicate Ore?
Page 54

YOU CAN DEPEND ON "Eucs"

Mine and quarry operators the world over have standardized on Euclid equipment for moving rock, coal, ore and overburden on the toughest jobs. At this big metal mine in Canada, for example, 12 "Eucs" of 22 ton capacity haul overburden and ore from a pit that's over 100 feet deep and will go down another 200 feet or more. These rugged Rear-Dumps have the stamina to withstand the day after day pounding of heavy excavation loaded by large shovels. With 300 h.p. diesel engines, they have plenty of power for carrying big loads on difficult hauls at travel speeds that mean more loads per hour.

Other Rear-Dump "Eucs" have capacities of 10 to 50 tons . . . engines of 143 to 600 h.p. . . . single and tandem drive axles . . . 5 or 10 speed transmissions or Torqmatic drive . . . spring mounted or semi-rigid drive axles. Your Euclid dealer will be glad to discuss your off-the-highway hauling problems and provide a production and cost estimate for present or planned operations. There's a good chance that he can show you the way to lower hauling costs.

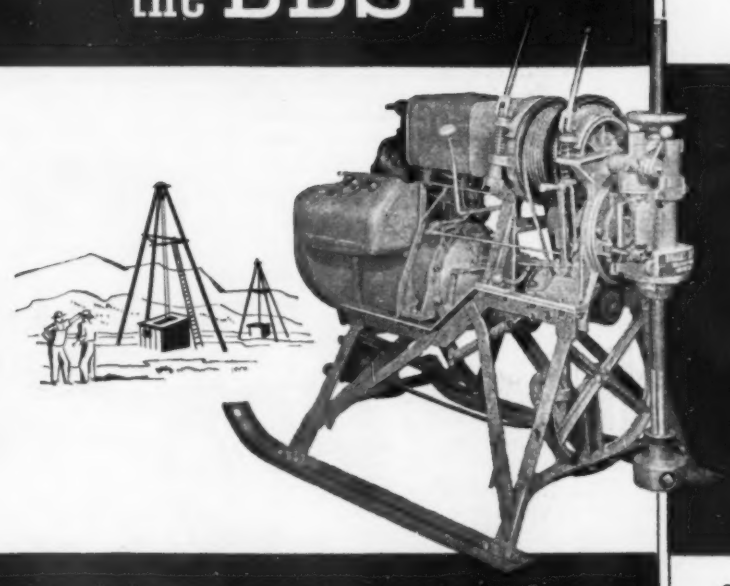
EUCLID DIVISION
GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

Euclid Equipment

GM GENERAL MOTORS

you're looking at the most USEFUL surface diamond drill you can buy

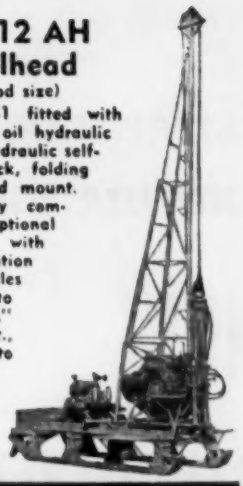
the BBS·1



• with 12 AH swivelhead

("B" rod size)

Here is BBS-1 fitted with twin cylinder oil hydraulic swivelhead, hydraulic self-centering chuck, folding mast and skid mount. This assembly combines exceptional feed control with high penetration speed. Handles "B" rods to 650 ft., "A" rods to 900 ft., "E" rods to 1200 ft.



• with 1-JEG swivelhead

("E" rod size)

This heavy duty gear feed swivelhead incorporates an instant shift mechanism to any of four feeds, regardless of speed or bit pressure. Handles "E" rods to 1200 feet. This head is interchangeable with our JV model.

• with 12 AG swivelhead

("A" rod size)

Equipped with this four feed gear swivelhead, BBS-1 handles "A" rods to 900 ft., "E" rods to 1200 ft. — gives heavy drill performance at minimum weight and cost. All BBS-1 combinations available with 24 or 30 h.p. Wisconsin gasoline or 32 h.p. diesel engine.

• also BBS-1 Jr.

All swivelheads illustrated are available on lighter BBS-1 Jr. model with 12 h.p. gasoline or 15 h.p. diesel engine. Capacities: "E".....600 ft. "A".....400 ft. "B".....300 ft.

DRILLS • BITS • EQUIPMENT • CONTRACTING
The World's Most Complete Diamond Drilling Service

BOYLES BROS
DRILLING COMPANY LTD.
VANCOUVER, CANADA

Boyles Bros. Drilling Co. Ltd., Newcastle-on-Tyne, Eng.
Claude Angwin (Pty) Ltd., Johannesburg, South Africa.
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I. H. Hanne, 331 Santa Cruz, San Isidro, Lima, Peru.
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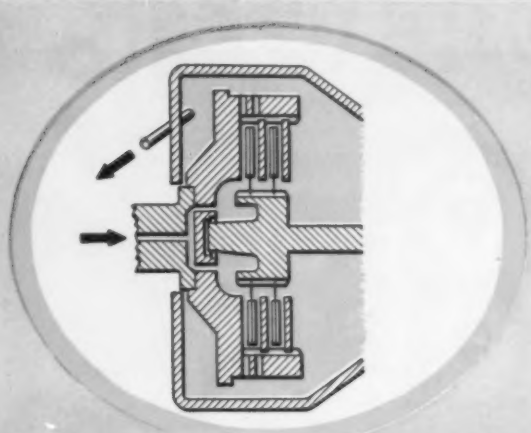
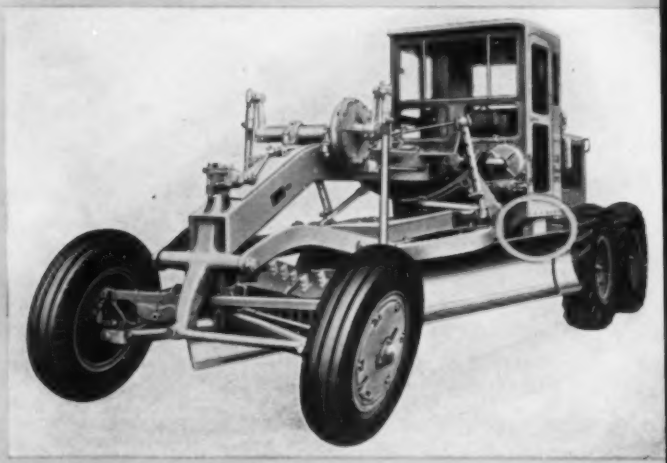
Shriro Trading Co., S.A., Tokyo, Japan.
Wiese & Co., Lda., Lisbon, Portugal.

CATERPILLAR ANNOUNCES ANOTHER "FIRST":

NEW OIL CLUTCH for the NO. 12 MOTOR GRADER



Arrows show path of oil through housing with clutch disengaged. Facings remain cool and bathed in oil, which is carried to outlet at top by flywheel ring gear. The two steel clutch discs and clutch brake are faced with pressure-processed cork, which gives an excellent coefficiency of friction and long wear.



The new oil clutch for the No. 12 Motor Grader gives you the same reliability and improved performance as the thoroughly job-proved oil clutch in Caterpillar track-type Tractors. Rugged and reliable, it uses oil from the engine lubrication system. Here are some of the things the new oil clutch for the CAT* No. 12 can mean to *you:*

LONGER WORK LIFE—In actual on-the-job tests, clutch facings wear less than the thickness of a human hair in one thousand hours' operation! Thick clutch facings mean that work life is extended thousands of hours before discs need be replaced. And constant "oil bath" lubrication reduces wear on all moving parts.

LESS MAINTENANCE—Adjustment every 1500 hours is not unusual, after initial "break in." This is equivalent to nearly nine months without adjustment on road maintenance work! No external lubrication is needed: internal oil system lubricates pilot and throwout bearings.

GREATER EFFICIENCY—The clutch is constantly cooled, never exceeding normal engine oil temperature. This practically eliminates clutch fade, greatly reduces slippage due to overheating, and means that the clutch retains "like new" operation for thousands of hours.

Caterpillar Tractor Co., San Leandro, Cal.; Peoria, Ill., U.S.A.

CATERPILLAR*

*Cat and Caterpillar are Registered Trademarks of Caterpillar Tractor Co., U. S. A.

99% OF ALL CAT MOTOR GRADERS ARE STILL IN USE

Mining World

Including the Export Edition **WORLD MINING**

Published monthly except in April when publication is semi-monthly

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COVER DIAGRAM illustrates how a magnetic negative profile caused by hydrothermal alteration surrounding an ore body can be used as a guide in ore search. Normally the anticline would produce a magnetic high (pattern of the broken line), but solution destruction of magnetite forms the magnetic negative.

PUBLISHING OFFICE
Emmett St., Bristol, Conn.

EDITORIAL AND EXECUTIVE OFFICES
121 Second St., San Francisco 5, Calif., GArfield 1-5887

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Dist. Mgr., New York — A. E. Roberts
Dist. Mgr., Chicago — R. N. Crosby
Assoc. Ed., Van. — Charles L. Shaw

BRANCH OFFICES

New York 17—370 Lexington Ave., Murray Hill 3-9295. Chicago 26—1791 Howard, Rogers Park 4-3420. Vancouver, B.C.—402 Pender St. West, MArine 7287.

PUBLISHED BY

American Trade Journals, Inc.
Miller Freeman, President — W. B. Freeman, Vice President
L. K. Smith, Vice President — Miller Freeman, Jr., Sec.-Treas.

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Mining World Subscription Rates

U. S. North, South and Central America	$3.00
Other Countries	$4.00
Single Copies	$ .50
Directory Number	$1.00

WORLD MINING is published the 26th of each month as a regular department of MINING WORLD and is also circulated as a separate publication on a carefully controlled free basis to a selected list of management and supervisory personnel associated with active mining enterprises throughout the world.

MILLER FREEMAN PUBLICATIONS

GRAB SAMPLES From the Mail

How To Prospect Today

Dear Sir:

The other day I was shown a letter from two gentlemen to a mine operator detailing a prospecting proposition. The list they gave of requirements for the expedition was so different from the old burro days that I am sending it along for your amusement and publication. Here it is.

$ 200	Proper clothes for two
$ 240	Hotel bills, two rooms
$ 270	Food bills, $1.50 a meal for two
$ 250	For gas hammer and other tools
$ 250	For Jeep and truck now and then to get in and out of different places
$ 200	For assays of ore
$ 50	Tips in restaurant and hotels
$ 125	For gathering information from miners for drinks
$ 210	Gas and oil
$ 150	For options and contracts
$ 55	Powder and small items
$2,000	Would need $1,000 each for 30 days

J. Fred Johnson

The Deadwood Gold Discovery

Dear Sir:

I have read with much interest Muriel Sibell Wolle's article ("Camps in Deadwood Gulch," March 1955). . . . Mrs. Wolle credits discovery to the Bill Lardner party. This is not true.

In 1874 my father had a contract for cutting cotton wood ties for the Union Pacific Railroad . . . near Rullo, Nebraska. In his crew there was a squaw man named Jim Pierman, a man in his late forties. The parents and grandparents of his squaw had made several trips into the Black Hills for tepee poles and hunting. On one of their trips they had encountered another hunting party one of whom had found gold. Pierman had a map showing where the discovery was made.

The air was full of rumors of discoveries of rich diggings in Montana and the Black Hills. Early in 1875 my father finished his tie contract and from his crew he organized a party of six men including himself to make a run for the Black Hills.

On the evening of August 10, 1875 they came down a gulch which they named Spruce Gulch and camped that night on the present site of the Northwestern Railroad round house. You can bet they were out bright and early the next morning. My father took the first pan of dirt from the creek opposite the old Deadwood High School. He showed me the place many times. This was DISCOVERY. This was the first gold panned in the Northern Black Hills, and this was the first party of white men in what is now Deadwood.

Two weeks later on the 25th of August, 1875, Bill Lardner came in with his party of 11 men. . . .The Gay brothers were in the party, also Hilon Hulin, whom I knew very well. Lardner was the captain of the party.

The actors in the original drama are all dead. The ranks of us who had the history from them first hand are rapidly thinning. Napoleon said, "history is a fable agreed upon." Let's set the record down straight.

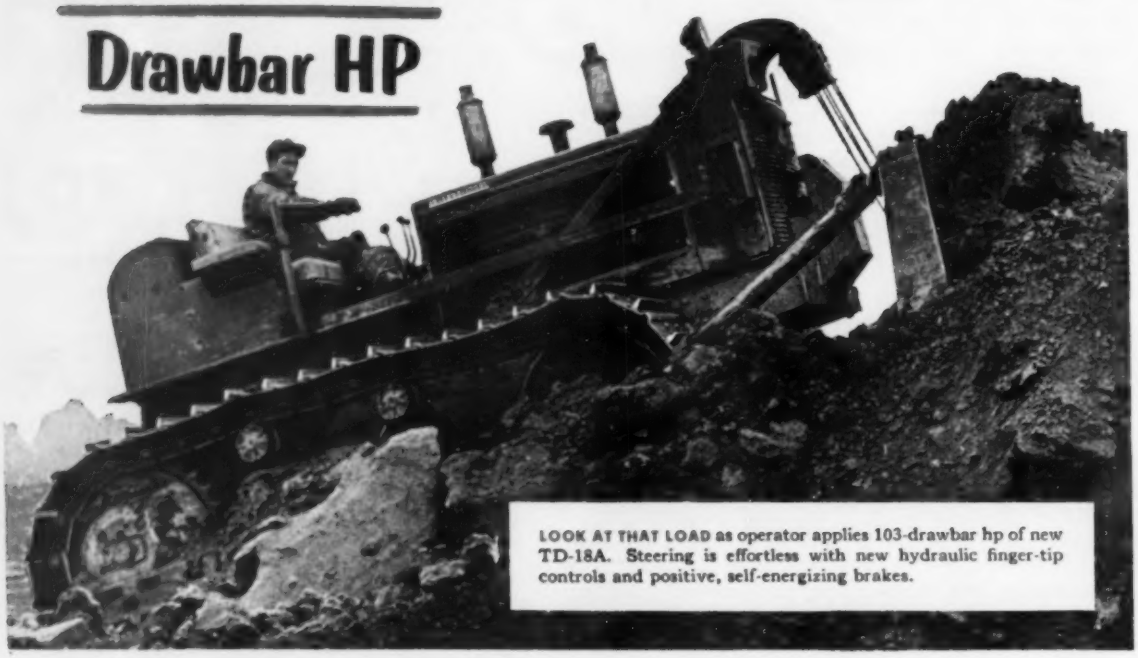
Frank B. Bryant
Landusky, Montana

MINING WORLD, August, 1955. Volume 17, No. 9. Published monthly, except April, when publication is semi-monthly at Emmett St., Bristol, Conn. Executive, advertising and editorial offices, 121 Second St., San Francisco 5, California. Subscription in United States, North, Central and South America, $3.00 per year; other countries, $4.00 per year. Entered as second class matter Oct. 10, 1951 at the Post Office at Bristol, Conn., under the Act of March 3, 1879. Postmaster: please send notice 3579 to MINING WORLD, 121 Second St., San Francisco 5, Calif.

New Increased Power

INTERNATIONAL TD-18A

Now with 103 Drawbar HP



LOOK AT THAT LOAD as operator applies 103-drawbar hp of new TD-18A. Steering is effortless with new hydraulic finger-tip controls and positive, self-energizing brakes.

NEW Power . . . New gearing . . . New ruggedness —for greater production

NEW Track Frames . . . 300 per cent stronger

NEW Finger-Tip Power Steering . . . advanced hydraulic design

NEW Operator Compartment . . . comfortable driver's seat—easy-to-reach controls

NEW Track Roller Oil Seals . . . 500-hour period between lubrications

NEW Positive Self-Energizing Brakes, 13% more effective brake area

NEW Appearance . . . sleek grille, heavy fenders, 75-gallon fuel tank. Better visibility . . . control-tower view front and rear

Here's the crawler tractor with everything contractors need to meet increased competition—increased work-power, increased ease of operation, increased durability:

The improved INTERNATIONAL TD-18A, now with 103-drawbar horsepower at 24,300 lbs. maximum draw-bar pull in first gear at rated rpm.

Double check all these great new TD-18A features—right here on this page—on your job where you can take over the controls and appraise their value in extra work done for lower cost. Your INTERNATIONAL Industrial Power Distributor will arrange your own personal shake-down test of the TD-18A any time you say.

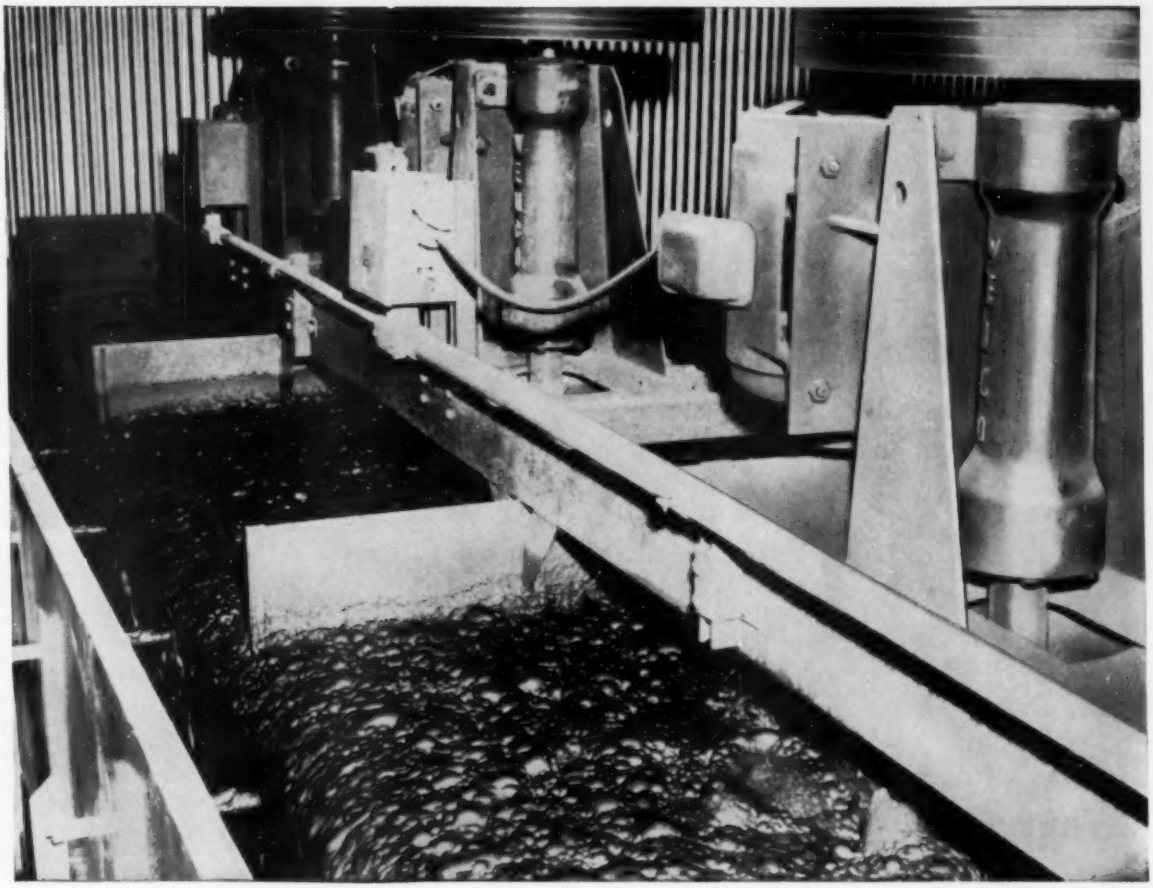
INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

INTERNATIONAL HARVESTER

INTERNATIONAL
INDUSTRIAL POWER

MAKES EVERY LOAD A PAYLOAD

DOW



RELIABLE DOW XANTHATES BRING INCREASED RECOVERY

Fast, complete separation of sulfide minerals at minimum cost can be yours through Dow Research

Increased recovery and improved concentrate grade show up immediately when you put Dow Xanthates to work in your mill. This has been proved in mills all over the world where these superior Dow collectors are improving metallurgy and saving dollars.

These Xanthates permit greater freedom in regulating frother and collector independently because they are reliable collectors, but substantially nonfrothing.

To fill your need for a quality frother, however, give Dowfroth® 250 a trial. It builds hard-working froth with reduced consumption.

Take advantage of Dow's many years of experience and research. To learn more about the quality flotation agents, Dow Xanthates and Dowfroth 250, write us for information and test samples. THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. OC 818J.

you can depend on DOW CHEMICALS

DOW

Sherritt Gordon and Gardner-Denver partners in pioneering

Congratulations Sherritt Gordon! We are proud that Gardner-Denver has played an important part in Sherritt Gordon mining operations at Lynn Lake, from development to production. Much of the initial shaft-sinking was done by Gardner-Denver S48T sinkers—all cross-cutting and drift work with Gardner-Denver Model J track mounted jumbos with SF73 drifters—sublevel drifts driven by Gardner-Denver air leg mounted S48's—and all blast hole drilling with SFH99 deep hole machines.

Gardner-Denver products used by Sherritt Gordon include:

GH9 and GD9H mine car loaders
Series J 3-boom jumbo
SF73 drifters
SFH99 drifters for all blast hole drilling
S48 sinkers with FL2AY-4 feed legs
R94 and R104 stopers
Model HK tugger hoists servicing sublevels

GARDNER-DENVER Since 1859

KELLER TOOLS

GARDNER-DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois

Export Division: 233 Broadway, New York 7, N. Y., U. S. A.

2300 ft. underground

7 Rear-Dumps haul million tons of limestone yearly

Imagine yourself with the problem that faced a large Eastern chemical company a few years ago.

Your plant needs thousands of tons of limestone daily for manufacture into agricultural lime and cement, and for chemical processing into chlorine, soda ash, and other products. Much of your stone has to be shipped in. Transportation prices are boosting your costs.

With these difficulties, you'd undoubtedly do what this company did — look for a nearby source. You'd probably never guess what would turn up. Some 2,300′ below your own backyard, under clay, shale, and sandstone, your drills would run into a 50′ layer of almost pure limestone. Satisfactory material, tests showed, for all your needs. But how could you get to it?

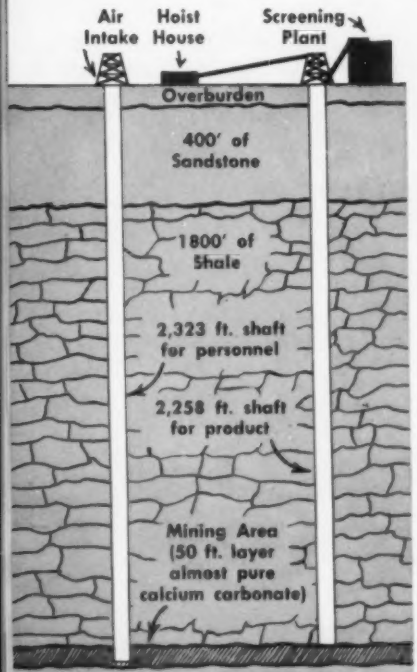

Air Intake
Hoist House
Screening Plant
Overburden
400′ of Sandstone
1800′ of Shale
2,323 ft. shaft for personnel
2,258 ft. shaft for product
Mining Area (50 ft. layer almost pure calcium carbonate)
300 ft. layer of dolomitic limestone unsuitable for mining because of high content of magnesium

Diagram shows the two 8′ x 17′ shafts. One carries men and equipment, the other brings crushed limestone to the surface. Shafts also carry in 100,000 cubic feet of fresh pumped air every minute. They also take out blasting and diesel fumes. The natural mine air is dry . . . no water drips from ceilings or seeps through walls. Temperature stays 80° year-round. Cave-in dangers are absent . . . strength of the limestone sidewalls, plus arching effect of 2,000 ft. of rock above, eliminates need for shoring or other artificial bracing.

Sink two 2300′ shafts

This company answered that question by borrowing some ideas from underground ore and coal miners. First, they drove two 8′ x 17′ steel-and-concrete-lined shafts vertically to the limestone bed. Then, they developed a network of underground roads (now totaling 19.9 miles) to a centrally-located crusher. Next they equipped the mine with 4 electric shovels, 9 drilling rigs, a tractor, 4 loaders, 4 trucks, and a bus to move 80 workers to their assignments.

For hauling, they chose 7 LeTourneau-Westinghouse Rear-Dumps, 16-ton models with bodies built up to hold 20 tons. These units, company officials figured, would be ideal for underground use, because they could turn non-stop anywhere on the narrow 32′ roadways — and their simple rugged construction would reduce repair work.

Assemble machines on mine floor

Then came another problem: how to get these big Rear-Dumps into the mine, nearly ½ mile below? LeTourneau-Westinghouse engineers helped out here. The rigs were shipped to the plant tack-welded. Wheels and prime-movers were separated and lowered down the shaft. Truck bodies, too, were cut apart and lowered. Re-welds and re-assembly were made on the mine floor, and work was started.

With the 1½-yd. shovels loading well-blasted limestone, each Rear-Dump gets 20-ton heaped load in about 2 minutes. Haul of 3,000′ one way over the level underground roads is made in 2nd and 3rd gear (7 and 13 mph); return in 3rd. The 7 Rear-Dumps average 3,600 tons of limestone per 16-hour day . . . over a million tons per year. Short turns with power steer have proved a major advantage in speeding spots at shovel, for backing to dump into hopper, and for maneuvering in all tight spots.

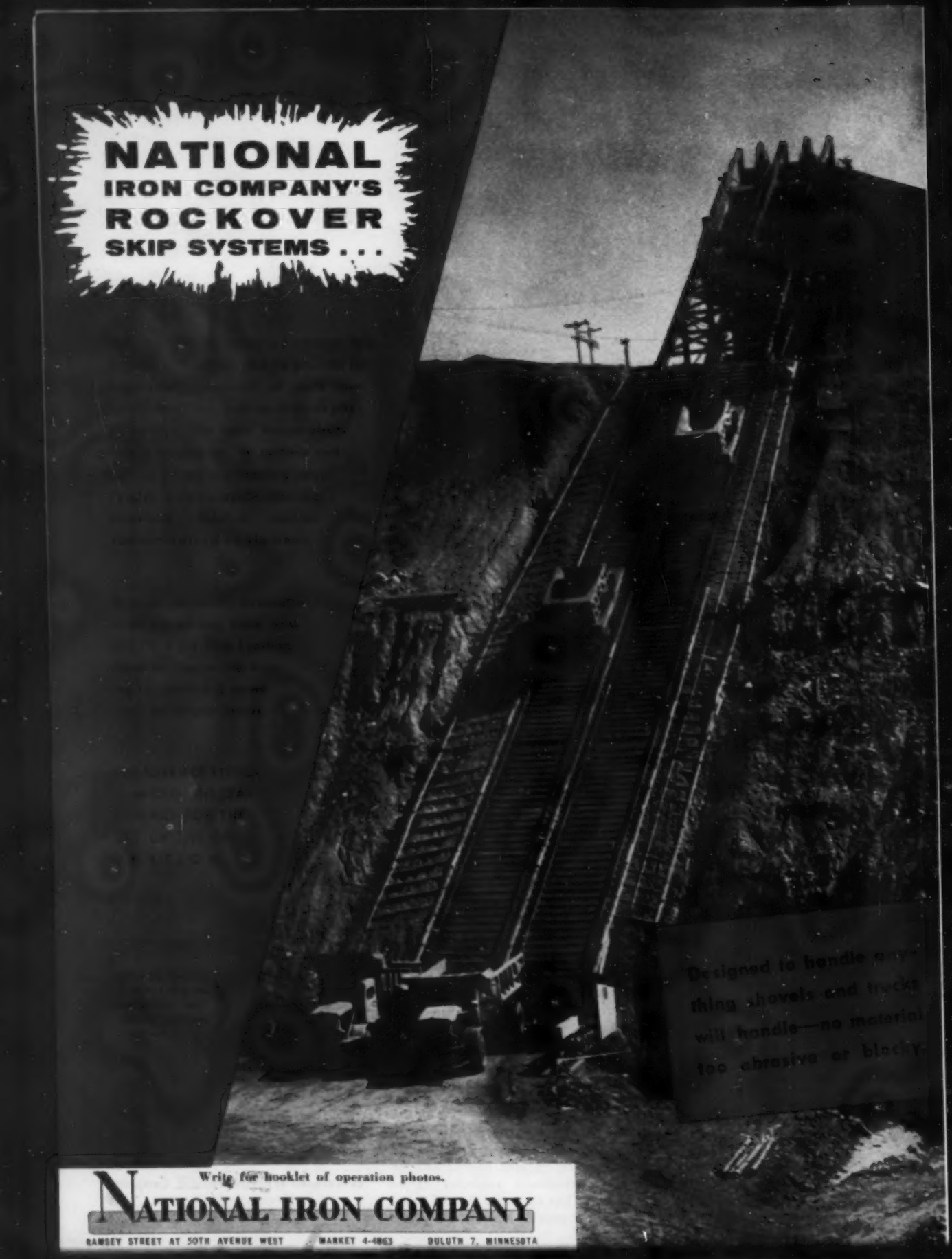
Another advantage these Rear-Dumps have given is safety. *Each* of the 4 wheels has more braking surface than *all 4* wheels on most haulers. Operators travel confidently at high speeds.

A third advantage . . . there has been practically no downtime for tire troubles on the Rear-Dumps' big single pneumatics. In 4 years of single and double-shifting the 7 units, only one blowout has occurred. Sets of tires have lasted as long as 7,000 hours without recapping, despite the rough pit floor and heavy 20-ton loads. Plant records show over-all mechanical efficiency for all the Rear-Dumps of 96%.

You, too, can solve your hauling problems with LeTourneau-Westinghouse Rear-Dumps. Ask for a demonstration on your job. There is a size to fit your needs . . . 11, 22, and 35 tons.

LeTourneau-WESTINGHOUSE Company
PEORIA, ILLINOIS
A Subsidiary of Westinghouse Air Brake Company
R-664-Q-b

NATIONAL IRON COMPANY'S ROCKOVER SKIP SYSTEMS . . .



Designed to handle anything shovels and trucks will handle—no material too abrasive or blocky.

Write for booklet of operation photos.

NATIONAL IRON COMPANY

RAMSEY STREET AT 50TH AVENUE WEST — MARKET 4-4863 — DULUTH 7, MINNESOTA

Modern methods speed opening of new coal mine

in Turkey

Since the end of World War II, modernization has reached into many fields of the Turkish economy. New airports and roads have been built, factories erected, and new mines opened. With this stepped-up economy, the search for vitally-needed coal, too, has spread.

One important development is at Kozlu, on the Black Sea. Here, Eregli Coal Fields Exploitation of Zonguldak, is sinking several shafts to reach extended underground bituminous deposits. Perhaps the busiest unit on their project is a 4-wheel rubber-tired Tournatractor with dozer blade.

1 Tournatractor replaces 2 crawler-tractors and 1 grader

With its faster than crawler-tractor speeds, 19 mph instead of 3 to 6 mph, Tournatractor handles many widely-scattered maintenance assignments. Its primary task is maintaining two areas where material excavated from the new mine shafts is dumped. To handle this work, Tournatractor shuttles 6/10 of a mile between the dumps and levels all the muck, rock and shale hauled to the 2 locations by *eight* 22-yd. capacity trucks. This fast rubber-tired tractor also grades 3½ miles of haul road twice a day. In spare time, it cleans spillage from around the mine shafts. Mine officials report that the *one* Tournatractor does the same amount of work on all these tasks as did *two* track-type tractors and *one* motor patrol it replaced.

Tournatractor levels muck at dump area located on the shore of the Black Sea. With big tires and 208 hp, unit has plenty of traction to work in the slick material. When dump has been brought up to level, it will be used as a storage area for mine timber supports.

Leveling present timber storage area, Tournatractor dozes earth and rock. Machine later will spread loose fine earth over the rock to provide a smooth floor.

Tournatractor makes cut along base of cliff to build haul road to new dump area. Blade carries 2½ cu. yds. of material per pass. Rig shuttles between jobs at 19 mph.

Tires reduce maintenance costs

Most of this increased efficiency is the result of using tires instead of tracks. Tournatractor can travel at 19 mph as well as work at higher speed than a crawler-tractor. With tires, there is no need for expensive repairs or the time-consuming lubrication necessary with the 400 to 500 parts of an average track assembly.

You can obtain similar efficiencies and lower equipment costs on your mine exploration and development program. Let us help you check Tournatractor savings. Send for output data. There is no obligation.

Tournatractor—Trademark Reg. U.S. Pat. Off. D-326-M-b

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

POWER PACKED BY HUBER-WARCO for TOUGH JOBS

Huber-Warco Motor Graders handle all jobs efficiently and economically, with a minimum of costly "down-time" for blade adjustment on the job. The real tough jobs are a snap for the Huber-Warco Motor Graders.

Huber-Warco 4D Series Motor Graders range from 75 to 123 Horsepower. The 5D-190, with torque converter and power-shift transmission, develops 195 H.P.

CHECK THESE HUBER-WARCO FEATURES

- Completely cab-controlled blade movement, 90° either side—no manual adjustments.
- Mechanical steering with hydraulic booster.
- High front and rear axle clearance.
- Retractable scarifier permits 360° blade rotation for back-up pass.
- Easy to reach controls.
- Wheels and tires are completely interchangeable.

For Complete Details — See Your Huber-Warco Distributor

HUBER W WARCO

HUBER-WARCO COMPANY

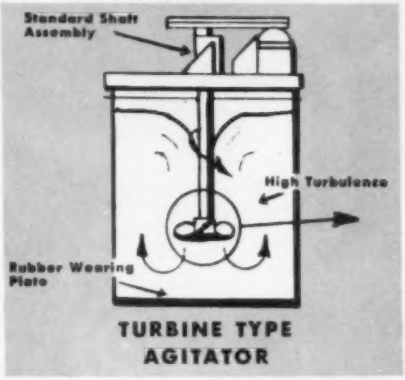
MARION, OHIO, U. S. A.

Road Machinery

CABLE ADDRESS: HUBARCO

ROAD ROLLERS • MOTOR GRADERS • MAINTAINERS • GRINDERS

Here are the tools to help you solve your Agitation problems and *Increase Profits!*

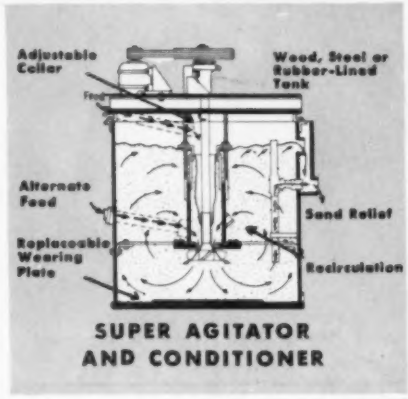


TURBINE TYPE AGITATOR

DENVER Agitators for mixing and leaching

(Copper, uranium, vanadium, lithium, cobalt, zinc)

Denver Agitators and Conditioners are the only machines that are flexible enough to be adapted to meet changing ore conditions. Heavy duty construction gives you dependable service 24 hours a day!

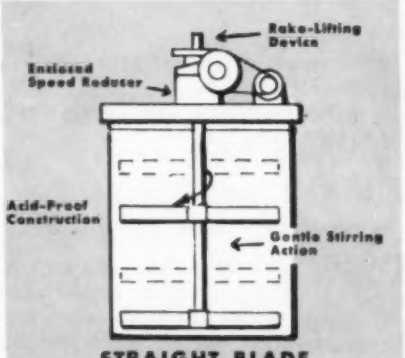


SUPER AGITATOR AND CONDITIONER

DENVER Agitators for flotation

(Barite, phosphate, fluorspar, iron, lead, zinc, copper feldspar)

The patented Denver standpipe gives you a flexible tool to change agitation and aeration to meet your exact requirements. These fool-proof machines will mechanically do your job—low maintenance.



STRAIGHT BLADE STIRRER

DENVER Agitators for precipitation

(Vanadium, lithium, uranium, copper)

This new machine was designed by DECO engineers especially to meet the needs for leaching operations in the Uranium industry—complete suspension of solids without excessive agitation. It is another example of how DECO engineers help their customers solve special jobs!

Our Bulletin A2-B4 describes these Denver Agitators in detail.

WHAT DELIVERY DO YOU NEED? INVESTIGATE NEW LOW PRICES!

"The firm that make its friends happier, healthier and wealthier"

DENVER EQUIPMENT COMPANY

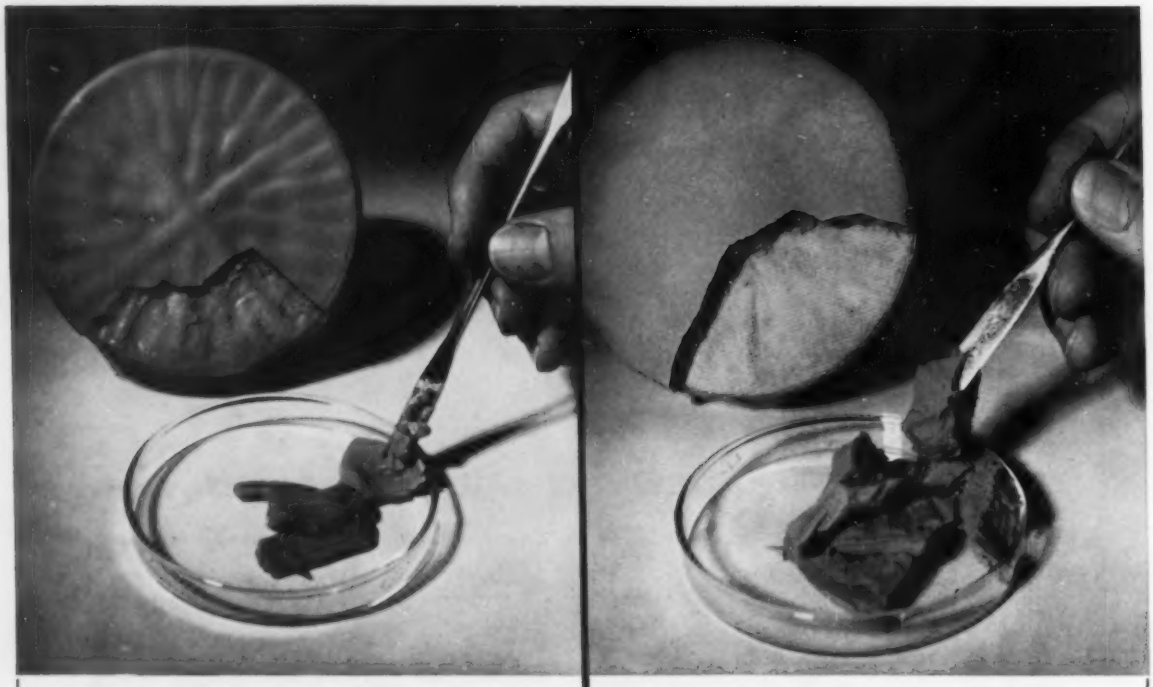
1400 SEVENTEENTH ST. CHerry 4-4466 DENVER 17, COLORADO

Denver • New York • Chicago • Salt Lake City • Toronto • Vancouver • Mexico D.F. • London • Johannesburg

Separan 2610

DOW

GREATLY IMPROVES FILTRATION



Above picture shows thin cake formed on filter with untreated solids. Cycle includes 15-second cake formation and 45-second drying time.

During the same cycle, a much thicker cake is formed by treating with 0.15 lb. of SEPARAN 2610 per ton of dry solids present.

New flocculating agent speeds up filtration and settling rates, brings many other improvements to liquid-solid separations

THE DOW CHEMICAL COMPANY
Dept. TS-789D-1, Midland, Michigan

Please send me information and a trial sample of SEPARAN 2610.

Name_____

Company_____

Address_____

City_____ State_____

Prove to yourself the advantages of Separan* 2610 in filtration.

1. Increased cake size
2. Decreased cake moisture and better washability
3. Easy to handle and less dusty cake
4. Less material loss in filtrate
5. Effective over wide pH range

Prove to yourself the advantages of Separan 2610 in settling.

1. Up to 40 times faster settling rate
2. Increased overhead clarity
3. Less materials loss in overhead
4. Reduced cost in acid and alkaline media
5. Increased plant capacity

SEPARAN 2610 is highly effective in these industries:

- Uranium
- Clay
- Borax
- Cement
- Alum
- Potash
- Foundry Sand
- Coal
- Phosphoric Acid
- Iron Ore and Taconite
- Industrial Water, and Waste
- Miscellaneous Metals

*Trademark of The Dow Chemical Company

you can depend on DOW CHEMICALS

DOW

LESS WASTED DRILLING TIME !

TIMKEN® interchangeable rock bits let you switch bit types without switching drill steels

Dozens of different TIMKEN® multi-use and carbide insert bits fit the same steel

YOUR drillers can change Timken® interchangeable rock bits quickly, easily, right on the job. They won't waste valuable drilling time going after a different set of drill steels every time a different bit type is needed. They'll simply unscrew one type of Timken bit and screw another right on the same steel. And they can make this change in one minute flat!

You get extra drilling economy because your drillers can always switch to the most economical bit as the ground changes—right on the job. And because dozens of different Timken multi-use and carbide insert bits fit the same steel, you don't have to carry an expensive inventory of drill steels.

Both Timken carbide insert and multi-use bits are made from electric furnace Timken fine alloy steel. Both have special shoulder unions that keep drilling impact from damaging threads.

Our rock bit engineers are experts at cutting drilling costs. Maybe they can save you some money? Drop them a line. There's no obligation. Write: The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

WHERE YOU CUT COSTS WITH TIMKEN MULTI-USE BITS

Most economical for ordinary ground. With correct and controlled reconditioning, they give lowest cost per foot of hole when full increments of steel can be drilled.

WHERE YOU CUT COSTS WITH TIMKEN CARBIDE INSERT BITS

Give highest speed through hard, abrasive ground. Also most economical for constant-gage holes, small diameter holes, very deep holes.

... your best bet for the best bit... for every job

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

MARION 2½ cu. yd. Shovel Strips Rock in Open-Pit Barite Mine

This MARION 93-M has a steady diet of rock in an Arkansas barite mine. Working in benches, it will eventually go to a depth of several hundred feet to follow the irregular shape of the barite vein.

The MARION works entirely in rock ranging from soft shale to hard sandstone.

Get the full story of what the 93-M can do to meet your heavy-duty, continuous-service excavating requirements. Write for Bulletin 397 (Diesel) or Bulletin 401 (Ward Leonard Electric).

MARION / MARION POWER SHOVEL COMPANY
MARION, OHIO, U. S. A.

A Subsidiary of Merritt-Chapman & Scott Corporation

POWER SHOVELS FROM ⅛ TO 60 CUBIC YARDS
PILE DRIVERS • WALKING DRAGLINES

DRAGLINES • CLAMSHELLS • LOG LOADERS
CRANES, CRAWLER & RUBBER MOUNTED • BACKHOES

Your Confidence Is Justified *Where This Flag Flies*

Now...a roof support that gives instead of collapsing

Here's a mine-roof control that's both safe and economical. It's called the Bethlehem Yieldable Arch because the arch yields instead of bending or buckling under excessive underground pressures.

The Yieldable Arch is made up of U-shaped segments heavily flanged to resist collapse and torsional stresses. Segments are joined by means of U-bolt clamps, creating friction joints which slide or yield before deformation can occur.

The yielding of the roof support permits the natural relaxation and stabilization of the surrounding strata. At the same time, the increased overlapping of the segments strengthens the arch and adds to safety in the mine.

Individual arches are tied together by horizontal struts which are clamped to the arch with special J-bolts. The struts help the arches to reinforce each other, and transmit lateral forces from one arch to the other. We can also furnish steel lagging with the arches, if desired.

The Yieldable Arch is easy to install, and has a high recovery value. It should pay for itself in its first year. A Bethlehem Pacific engineer is ready to give you the full story.

BETHLEHEM PACIFIC COAST STEEL CORPORATION

Sales Offices: Los Angeles, Phoenix, San Francisco, Portland, Seattle, Spokane

BETHLEHEM PACIFIC

BETHLEHEM STEEL

They're drilling Limestone for NEXT-TO-NOTHING A YARD...

...with this JOY "Blastair Drill"

In a Texas limestone quarry, a Joy Model 225 "Blastair" Drill set the following performance record . . . with a drilling cost of *less than two cents a cubic yard:*

Bit Size		6¼"
Footage Per Shift		300
Labor Cost Per Shift (Driller & Helper)	$20.80	
Fuel Cost Per Shift	5.00	
Lubricating Oil Cost Per Shift	2.00	
Total Labor & Fuel Cost Per Shift		$27.80
Labor & Fuel Cost Per Foot	$ .093	
Bit Cost Per Foot	.134	
Total Labor, Fuel, Bit Cost Per Foot		.227
Cubic Yards Broken Per Foot		13
Total Drilling Costs Per Cubic Yard		.0174

Performance figures will vary, of course, with other formations. However, they show the possibilities of cutting *your* drilling costs with this outstanding Joy drill.

The "Blastair" is a truck-mounted, rotary, "air-blast" drill. It is a fast mover between holes and is easy to set up in drilling position. Its outstanding features include hydraulic automatic chuck, heavy-duty hoisting drum, oil-bath chain-case power unit, and rugged sectional mast. It is a real top-performance, low-maintenance machine that is ideal for the rough jobs of quarry and open-cut mine drilling.

Find out for yourself how the Joy "Blastair" can cut drilling costs on your job as it did this. Write today for Bulletin RM-709 to ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

GASOLINE OR DIESEL DRIVE • 6¼" MAX. DIA. HOLE
20' FEED • DRAG OR ROTARY-CONE TYPE BITS

Consult a Joy Engineer

OR WRITE FOR BULLETIN RM-709

W&D M5505

JOY

PIONEER AND WORLD'S LARGEST MANUFACTURER OF ROTARY BLAST HOLE DRILLS

Cyanamid REAGENT NEWS

"ore-dressing ideas you can use"

"with the usual ingenuity of the American workman"

AEROFLOC® 548 Reagent Solves Copper Concentrate Thickening Problem

Reports from Cyanamid Field Engineers frequently combine human-interest notes with ore-dressing data. For instance, this comment on a copper flotation operation:

"They were having trouble with the copper concentrate thickener handling concentrates. It would not settle the tonnage put to it with the result that the thickener overflow coming back to flotation eventually raised the flotation tail seriously."

"A little AEROFLOC 548 solved this problem very easily. Mr. H., mill foreman, with the usual ingenuity of the American workman to do the job with the least effort, added a part of a shovel of AEROFLOC 548 in the mid-morning to the feed well of the copper concentrate thickener. This made a gummy ball of AEROFLOC over which the incoming froth ran for the remainder of the day until it was all in solution. During that time the thickener worked perfectly."

"Not only that, but the capacity of the filter doubled. Actually, it took half the time to filter than before adding AEROFLOC".

Although we usually recommend adding AEROFLOC Reagents as dilute water solutions, this report illustrates a way to do a job with the least effort. It also shows how AEROFLOC 548 accelerates thickening and increases filtration rates. Have you received samples and data on AEROFLOC REAGENTS?

AMERICAN Cyanamid COMPANY

MINERAL DRESSING DEPARTMENT

30 ROCKEFELLER PLAZA, NEW YORK 20, N.Y.

Cable Address — Limonitro, New York

NORTH AMERICAN CYANAMID LIMITED
Royal Bank Bldg., Toronto 1, Ontario, Canada
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G. B. O'MALLEY, MALCOLM GLEN,
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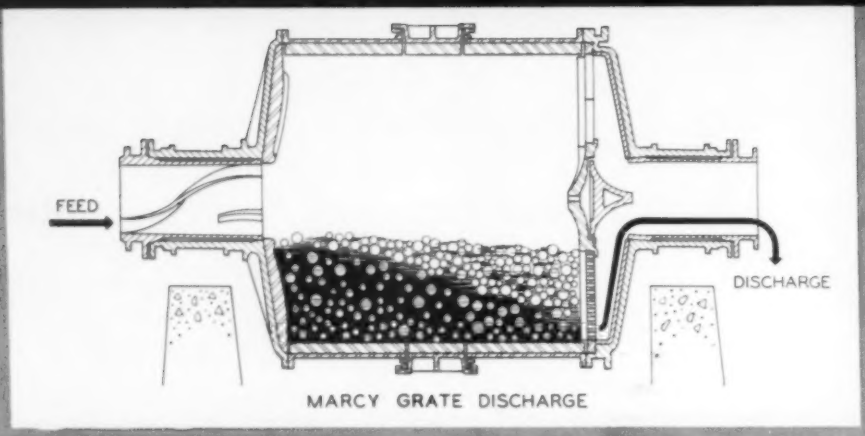
Printed in U. S. A.

MARCY Grate Discharge

increases tonnage 25 to 45%
decreases KWH per ton



MARCY GRATE DISCHARGE

"Rapid change of mill content is necessary for high efficiency"... that's the Marcy principle of grinding.

The "rapid change of mill content" is accomplished by use of the Marcy* **full-grate** discharge on ball mills and the **open end** feature on Marcy rod mills. This results in a low pulp line which provides an active, effective grinding mass to act on particle size reduction only... there is no wasteful cushioning action by high pulp levels. There is a faster migration of fines than oversize particles, thus less overgrinding. This basic principle of grinding is incorporated in all Marcy Mills and has proved, in hundreds of installations, to give greater output with lower KWH per ton, from 25 to 45% more tonnage compared with the same size overflow mills.

INCREASE IN TONNAGE WITH MARCY GRATES
124% GREATER THAN WITH OTHER GRATES

In seven representative installations where overflow mills were converted to Marcy Grates the average increase in tonnage was 33.6% with a decrease in power of 0.95 KWH per ton. An installation where an overflow mill was converted to grate discharge using another type grate the increase in tonnage was just 15% with a decrease in power of just 0.08 KWH per ton.

WRITE FOR NEW CATALOG NO. 101A

**Marcy is a registered trademark*

The Mine & Smelter Supply Co.

DENVER 17, COLORADO

OFFICES IN SALT LAKE CITY, EL PASO, 1775 BROADWAY, N. Y. C.

REPRESENTATIVES IN FOREIGN COUNTRIES

LIMA Type 1201 shovel and Type 1201 dragline stripping coal. The Type 1201 is equipped with a 24'-6" boom, 18'-0" dipper handle and 3½ cu. yd. dipper. The Type 1201 has gained world-wide recognition for its dependable performance and big output at low operation and maintenance cost.

LIMA'S fast service cuts costly downtime

From coast-to-coast Lima service engineers, warehouses and distributors are prepared to give you that extra-fast service or parts delivery which can make all the difference between continuous, profitable production and high-cost idleness of equipment.

When you buy a LIMA you can depend on long, trouble-free service, thanks to those extra quality features built into every LIMA. But if trouble happens and you need help, you get it from Lima . . . fast!

COMPARE QUALITY! No other machine gives you as much as LIMA!

1. Piston ring type dirt seal rings and retainers in crawler rollers.
2. Moving parts are flame or induction hardened for longer life.
3. Main machinery is placed well back of center of rotation.
4. Anti-friction bearings at every vital bearing point.
5. Big capacity drums and sheaves are easy on cables.
6. Propel and swing gears and power take-off are enclosed in a sealed oil bath.
7. Torque converter (optional on certain types).
8. Wherever you are, you can depend on skilled service and nearby warehouse stocks of parts to keep your LIMA on the job continuously.

COMPARE and you'll specify LIMA for shovels (to 6 yds.), cranes (to 110 tons) and draglines (variable). Smaller capacities available on rubber.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

Cable Address: Limashovel

LIMA SHOVELS · CRANES · DRAGLINES · PULLSHOVELS

BALDWIN-LIMA-HAMILTON

Construction Equipment Division · LIMA · OHIO · U. S. A.

Tailings Handling Made Easy

Closeup of 275 ft. dia. Dorr Thickener during final stages of construction. Part of Hydroseparator is visible behind walkway.

7450 TPD of copper tailings can be a big headache without proper disposal facilities. At a new Concentrator in Arizona the proven Dorr Hydroseparator-Thickener team is taking shock loads and variable feed characteristics in stride.

The giant Thickener — 275 ft. in diameter — dominates the picture. But equally important to successful operation is the 30 ft. diameter Dorr Hydroseparator. By scalping out oversize material ahead of the Thickener, the Hydroseparator boosts thickening capacity and cuts water losses in the underflow.

We'd like to tell you more about Dorr-Oliver's ability to provide the correct solution to tailings handling problems. Just drop a note to Dorr-Oliver Incorporated, Stamford, Conn. or in Canada, 26 St. Clair Ave. East, Toronto 5.

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH · ENGINEERING · EQUIPMENT
STAMFORD · CONNECTICUT · U.S.A.

Prospecting with two Universal 'Jeeps', F. K. Campbell explores a 100,000-acre lease in the remote, rough Sierra Blanca mountains of West Texas. One 'Jeep' carries complete radiation detection and recording equipment—the other is equipped with drill and plow. 4-wheel drive takes these 'Jeeps' up and down steep hills, through sand, and over rough, rocky terrain.

Standard equipment for uranium prospectors ...4-wheel drive Universal 'Jeep'

Interior view shows compact arrangement of instruments in the 'Jeep'. The 4-wheel drive Universal 'Jeep' is readily adaptable to almost any exploration or prospecting need.

Workhorse of the prospecting team is this 'Jeep' that operates a diamond drill. A front-end winch and a vertical-mounted plow remove surface rocks imbedded in top soil.

Exploration and prospecting in remote areas is only one of the many work applications for which the mining industry finds the Universal 'Jeep' ideal. Its rugged "go-anywhere" ability makes it perfect for transportation. With the extra traction of its 4-wheel drive, the 'Jeep' hauls ore trailers in trackless mining and performs many other assignments on rough terrain; then shifts easily into conventional 2-wheel drive for highway travel.

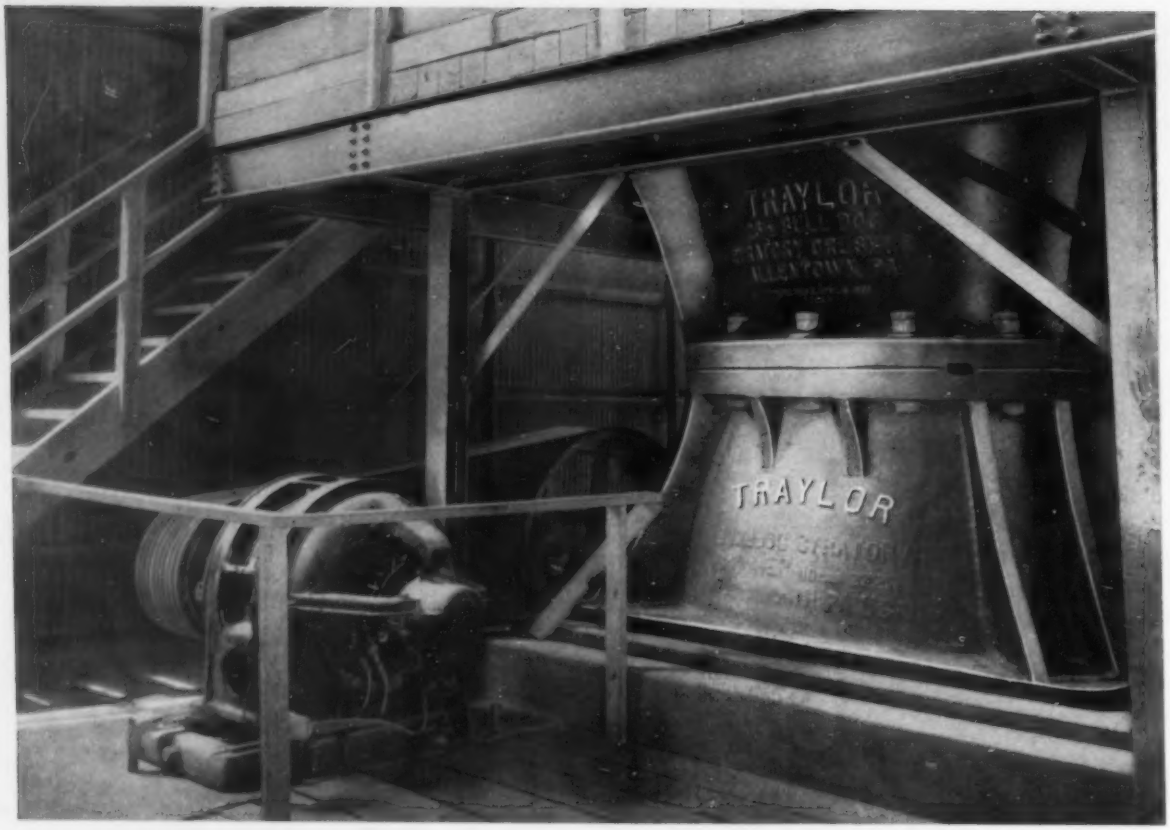
Owners can tell you of the 'Jeep's' dependable, economical performance, long life, and low maintenance costs.

Find out how this rugged, versatile vehicle can work and save for you. See your 'Jeep' dealer, or write for information.

4-WHEEL DRIVE UNIVERSAL 'Jeep'®

WILLYS... world's largest makers of 4-wheel drive vehicles

WILLYS MOTORS, INC., TOLEDO 1, OHIO



TRAYLOR TC GYRATORY CRUSHERS
trim crushing costs 3 ways

1. Traylor TC Crushers enjoy a job-proved reputation for producing great quantities of a uniform product with a single pass through the crusher.

2. Trouble-free, round-the-clock production . . . with capacities up to 66,000 tons per day of an 8″ product . . . is routine operation for a Traylor TC.

3. TC Crushers provide operators with an extra bonus in the form of extremely low maintenance requirements . . . even after years of rugged daily service.

Traylor TC Crushers feature Traylor's original Curved Concaves and Self-tightening Bell Head. Their direct application of crushing force practically eliminates lifting, churning, packing and choking of material in the crushing chamber. Traylor TC crushers are offered in 7 sizes with feed openings from 20″ to 60″ . . . discharge openings from 1½″ to 9″. Check these and other Traylor features in illustrated Bulletin 126. Send for copy today.

TRAYLOR ENGINEERING & MFG. CO.
733 Mill St., Allentown, Pa.
Canadian Mfrs.: Canadian Vickers, Ltd., Montreal, P. Q.

A Traylor leads to greater profits

SEND FOR BULLETINS
. . . just mention the Traylor Equipment that interests you.

SALES OFFICES · NEW YORK · CHICAGO · SAN FRANCISCO

complete line of HEAVY-DUTY cords helps you

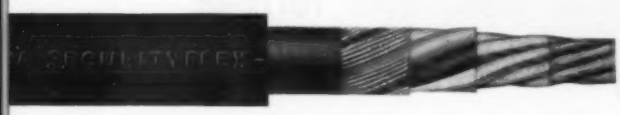
PICK THE RIGHT CORD FOR YOUR JOB!

Now—Anaconda introduces new portable cords with rugged construction . . . peak performance . . . and top flexibility for 3 types of service!

Severe applications . . . Hard usage . . . Standard service — Anaconda brings you 3 new engineered cords designed with the exact physical properties needed for each type of job—strength, flexibility and resistance to wear!

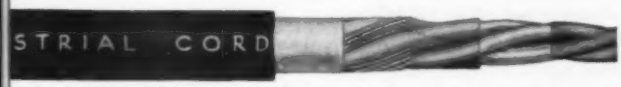
Select the cord *best suited* to your needs—based on good engineering and sound economics.

Whichever cord you choose, the Anaconda trademark is your assurance of *premium performance.*



SECURITYFLEX—Underwriters' approved Types SO and SJO.

SECURITYFLEX* CORDS for severest conditions. Toughest, sturdiest cords made . . . used where strength and wear-resistance are a "must." Neoprene jacket *mold-cured in lead* gives top crush, abrasion- and oil-resistance. Cords pay for themselves with long life under severest conditions—in mines, railroads, docks, and in heavy industrial use. Look for the molded-in name, "Securityflex!"



INDUSTRIAL—Underwriters' approved Types SO and SJO.

INDUSTRIAL CORDS for heavy industrial conditions and *maximum flexibility.* Lower in cost. Specially designed for use in heavy industry—where cords are in continuous operation and must be tough, flexible, oil-resistant. Tough neoprene jacket. Many industrials stock this one cord for use in virtually all applications . . . reducing inventory problems and costs. Look for the Anaconda marking on jacket.

SERVICE—Underwriters' approved Types S and SJ.

SERVICE CORDS for regular duty. Lowest in cost . . . yet have many features found only in higher priced cords of other makes. Special rubber jacket withstands abuse and moisture. Outstanding for appliances, office machines, portable tools—where flexibility and long life are needed.

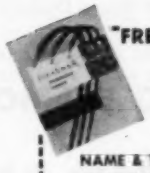
*Reg. U. S. Pat. Off.

see the man from . . .

ANACONDA®

about your

PORTABLE CORDS



FREE "PORTABLE CORDS" BULLETIN

Anaconda Wire & Cable Company,
25 Broadway, New York 4, N. Y.

Gentlemen: Please send me your new free "Portable Cords" bulletin, DM-5538.

NAME & TITLE .....
COMPANY .....
ADDRESS .....
CITY, ZONE, STATE .....

TRUCO CORING BIT

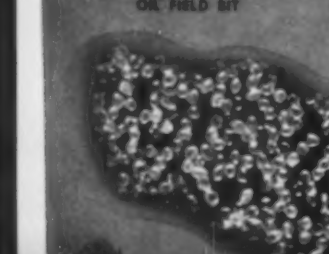
TRUCO CONCAVE BLAST HOLE BIT

TRUCO PILOT BIT

TRUCO IMPREGNATED CORING BIT

TRUCO REAMING SHELLS

TRUCO STANDARD OIL FIELD BIT



"Sell it and make your fortune Mynheer Van Niekirk"

It was the year 1876. Free America was 100 years old and there were great celebrations in Philadelphia. In London, Queen Victoria was proclaimed Empress of India.

In South Africa, children playing by the Orange River found a bright pebble, too pretty to throw away, but when trader Van Niekirk offered to buy it they shouted with laughter and told him to sell it and make his fortune.

But, nobody wanted to buy the pebble so Van Niekirk dropped it in an envelope and mailed it to a government agent who declared it to be a diamond of 21 carats. Then, the governor of the Colony bought it for five hundred pounds and sent it to the Paris Exhibition as a curiosity.

Nobody paid much attention, but this was the first clue to the existence of the diamond fields that would one day pour out fabulous treasures in gems—and in industrial diamonds, those incomparable cutting points which are the vital time-saving, cost-reducing element in Truco Diamond Bits.

With Truco Diamond Bits you get irresistible cutting power in any formation; swift, accurate penetration that reduces rig time and pays off handsomely in cash savings. May we send you our Truco Diamond Bit Catalog?

TRUCO DIAMOND BITS

by

WHEEL TRUEING TOOL COMPANY

3200 W. Davison Avenue, Detroit 38, Michigan

WHEEL TRUEING TOOL CO. OF CANADA, LTD.
575 Langlois Avenue, Windsor, Ont., Canada

How AMSCO® helps you HARDFACE MORE EFFECTIVELY

The complete line of 15 Amsco hardfacing rods represents a selection of the toughest, hardest alloys available. Among the metals used for alloying are these highly wear-resistant elements—manganese . . . chromium . . . nickel . . . cobalt . . . tungsten . . . molybdenum. Each has particular resistance to certain types of wear—including impact, abrasion, heat, corrosion.

Your Amsco distributor has many helpful methods for selecting the proper hardfacing rod to most effectively combat types of wear you contact daily. *Make him your hardfacing headquarters.*

AMSCO CATALOG MAKES ROD SELECTION EASY

Write for the free catalog, *Amsco Hardfacing Alloys.* It presents complete analyses, metallurgical information and other pertinent data about Amsco's complete line . . . making it easy for you to look up the right rod to use in hundreds of common hardfacing applications. It is easy to understand and to apply the suggestions to your own operations. Send for it today.

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Ill.

A ***BARGAIN***

THAT BY-PASSES THE DISTRIBUTOR

IS NO BARGAIN AT ALL!

In these times of mounting production costs, many purchasers of industrial supplies and materials are beginning to look upon their distributors as an extra expense. At first blush, it might *seem* cheaper to buy direct from the maker.

Actually, the distributor helps *both* the buyer and manufacturer save money. Like this:

He saves the buyer warehousing, handling and storage details, paperwork, provides an immediate single source of supply for thousands of items that industry needs, often in a hurry.

He saves the manufacturer the cost of heavy inventory maintenance in all parts of the country, the expense of an army of salesmen, a fleet of trains and trucks, and a staff of credit and collection experts. In a sense, your distributor represents a cooperative distribution facility that you share with all other firms in your area.

Next time you're tempted to get a direct quotation from the manufacturer, whether on a big or small item, figure out *all* the costs—not just the first cost—and you'll find you gain much more, yet in the long run pay no more, by utilizing the services of your distributor.

WICKWIRE ROPE

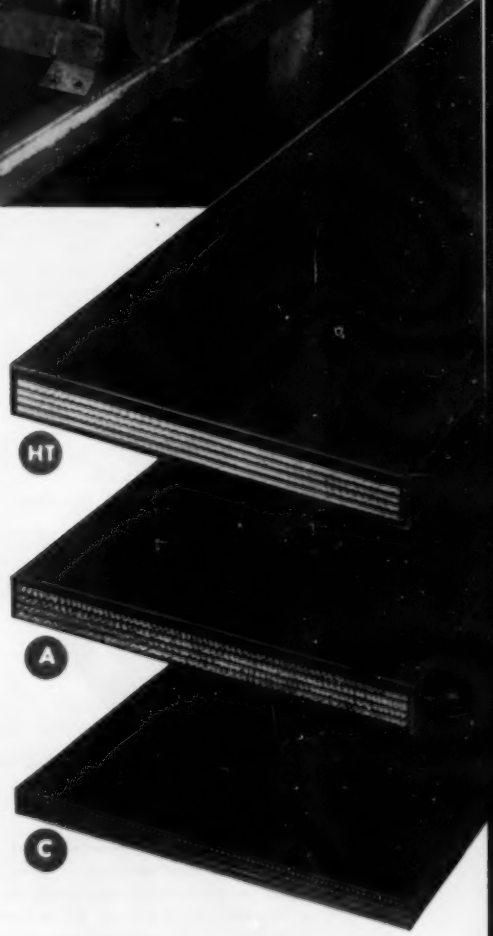
3151

A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION

Thermoid Conveyor Belting cuts handling costs on rugged mining jobs

There's a Thermoid Conveyor Belt designed to lower your handling costs on every mining job. Here are three examples: HT —For extremely abrasive materials such as coal, granite, trap rock, flint rock, quartz ore; A —For slag, lime rock, crushed stone and other highly abrasive materials; C —For moderate abrasives such as sand, loam, soda, gravel.

Thermoid's exclusive impregnation process welds carcass and cover into an exceptionally strong, durable belt. Finest quality reinforcement and specially compounded rubber stocks assure long life . . . lower your handling costs per ton. Your Thermoid Distributor carries a complete line of Thermoid Conveyor Belting, Multi-V Belts and Hose to meet the most severe requirements of any mining operation. Call him or write direct for full information.



Thermoid Western Co.

Conveyor & Elevator Belting • Transmission Belting • F.H.P. & Multiple V-Belts
Wrapped & Molded Hose • Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Offices and Factories: Nephi, Utah Trenton, N.J.

The GISMO offers you an entirely NEW concept of simplicity and economy in mining...

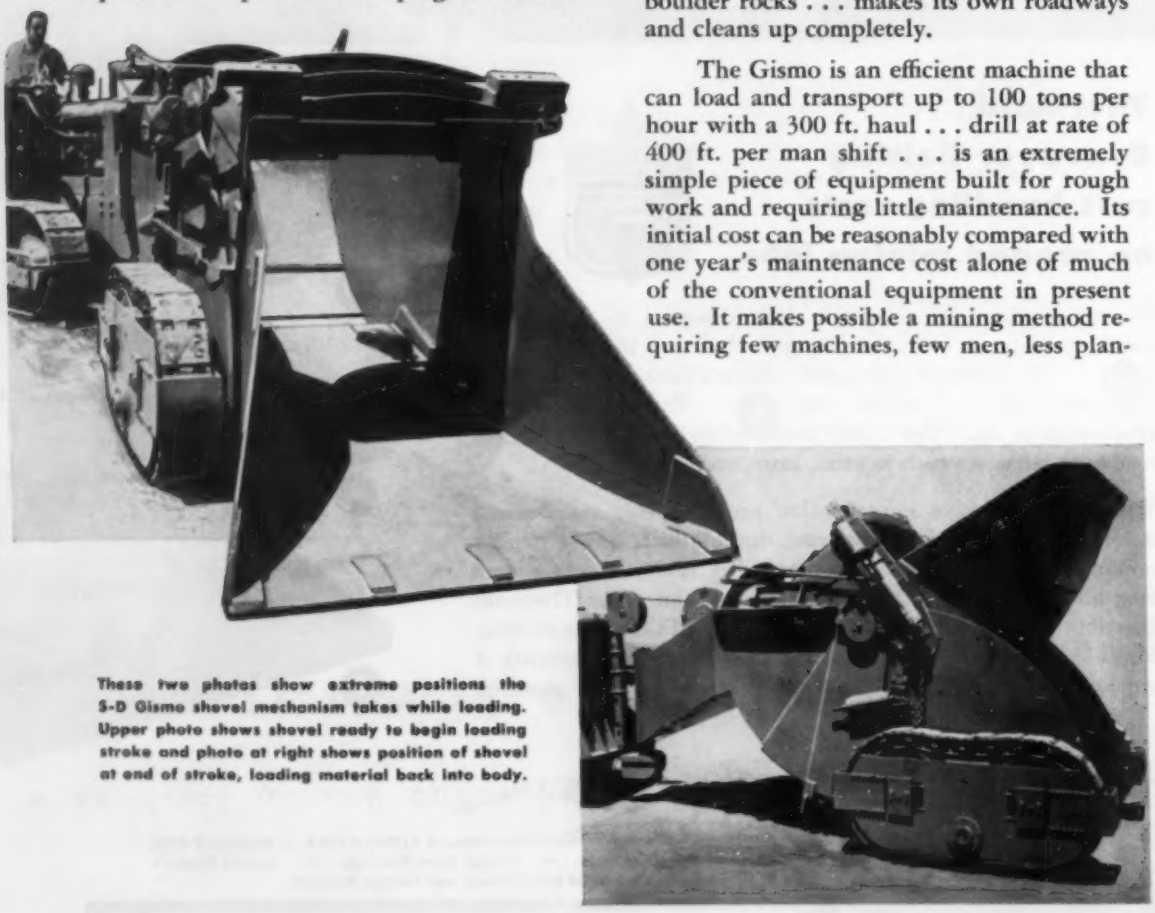
THE GISMO offers you a new method of mining. One that over a period of 2½ years of intensive development in actual work has proved beyond question advantages that merit its thorough investigation by any firm excavating rock or its equivalent.

The Gismo offers you a general purpose utility self-loading transport that is simple, versatile and built to take the brutal punishment of rock excavation—and at important savings! It is well suited to almost all mining conditions. No special development facilities or conditions are usually required. It operates in sloping ore bodies with irregular outlines, as well as large or relatively small openings. The Gismo is easily maneuverable at maximum or minimum speed of the equipment.

With perhaps a few exceptions, the Gismo can be taken into any mine. Its cross sectional dimensions are small compared with other equipment. It can be dis-assembled for lowering through small shafts.

Its versatility meets every requirement. It loads (mucks) in development or production . . . transports . . . drills (supports 2 to 5 jib mounted drills) . . . back fills . . . moves boulder rocks . . . makes its own roadways and cleans up completely.

The Gismo is an efficient machine that can load and transport up to 100 tons per hour with a 300 ft. haul . . . drill at rate of 400 ft. per man shift . . . is an extremely simple piece of equipment built for rough work and requiring little maintenance. Its initial cost can be reasonably compared with one year's maintenance cost alone of much of the conventional equipment in present use. It makes possible a mining method requiring few machines, few men, less plan-



These two photos show extreme positions the S-D Gismo shovel mechanism takes while loading. Upper photo shows shovel ready to begin loading stroke and photo at right shows position of shovel at end of stroke, loading material back into body.

ning and integration. It allows total mechanization of your mine—the solution to present economic conditions of high man-hour and materials cost, and low metal prices. Contact us for complete information. *Sanford-Day Iron Works, Inc., P. O. Box 1511 . . . Telephone 3-4191, Knoxville, Tennessee.*

The Gismo does not load by momentum or crash fashion! As it approaches the foot of muck pile, shovel head is eased into pile as simply as a hand shovel into sand. Material is actually shoveled under complete control of operator and within his complete vision. Photo at bottom of page shows Gismo with tractor, operated by only one man.

Sanford-Day IRON WORKS

KNOXVILLE • TENNESSEE

AND
BROWN-FAYRO DIVISION

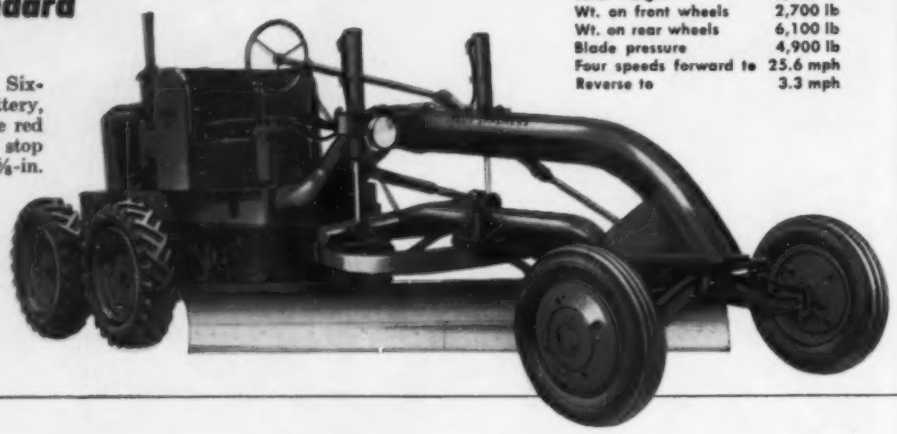
MINE CARS, All Types - PRECISION WHEELS - "Brownie" HOISTS CAR RETARDERS - SPOTTERS PUMPS - OIL SPRAY SYSTEMS

Model D *Standard*

(GASOLINE ENGINE)

Standard Equipment: Six-volt electric generator, battery, two white headlights, one red combination rear and stop light, muffler, 10-ft by ⅝-in. moldboard, hydraulic controls for moldboard lift, four 7.50-20 (6 ply) rear and two 6.50-16 (6 ply) front pneumatic tires with regular tubes.

Total weight	8,800 lb
Wt. on front wheels	2,700 lb
Wt. on rear wheels	6,100 lb
Blade pressure	4,900 lb
Four speeds forward to	25.6 mph
Reverse to	3.3 mph



Match your grading needs with

from the Allis-Chalmers model D motor grader line

Model D Diesel *Standard*

Total weight	9,350 lb
Wt. on front wheels	2,760 lb
Wt. on rear wheels	6,590 lb
Blade pressure	4,900 lb
Four speeds forward to	25.2 mph
Reverse to	3.2 mph

Standard Equipment: Twelve-volt electric generator, battery, two white headlights, one red combination rear and stop light, muffler, 10-ft by ⅝-in. moldboard, hydraulic controls for moldboard lift, four 7.50-20 (6 ply) rear and two 6.50-16 (6 ply) front pneumatic tires with regular tubes.

Both gasoline and diesel Model D's are available with any combination of accessories.

You can still buy a Model D for one-third the cost of a large motor grader, and it's the most popular, most versatile small grader on the market. In addition to the units illustrated, the Model D is available with other combinations of accessories . . . or with any of these useful attachments: rear-mounted ⅝-cu-yd loader; shoulder maintainer; one-pass windrow eliminator; V or blade-type snowplows. Ask your nearby Allis-Chalmers dealer for a demonstration . . . and prove the Model D's value to yourself.

Total weight	10,900 lb	Scarifier pressure	4,900 lb
Wt. on front wheels	3,750 lb	Four speeds forward to	25.6 mph
Wt. on rear wheels	7,150 lb	Reverse to	3.3 mph
Blade pressure	6,450 lb		

Fully Equipped as Follows: Six-volt electric generator, battery, two white headlights, one red combination rear and stop light, muffler, 10-ft by ⅝-in. hydraulically shiftable moldboard, 6-valve control group, four 8.25-20 (6 ply) rear and two 8.25-20 (6 ply) front pneumatic tires with regular tubes, front wheel lean, power circle turn, hydraulic scarifier, all-steel cab.

Model D Special
(GASOLINE ENGINE)

new economy and efficiency

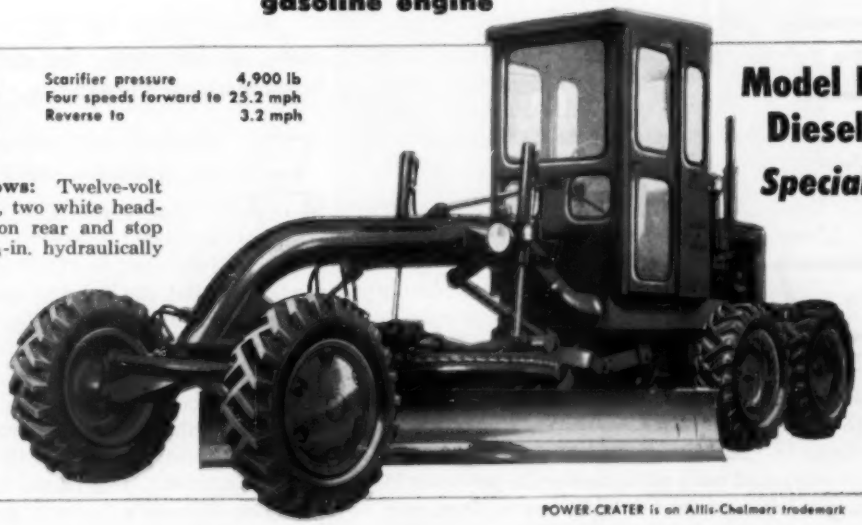
NOW AVAILABLE WITH YOUR CHOICE OF TWO OUTSTANDING ALLIS-CHALMERS ENGINES

50-hp POWER-CRATER gasoline engine

50-hp diesel engine with follow-through combustion

Total weight	11,450 lb	Scarifier pressure	4,900 lb
Wt. on front wheels	3,750 lb	Four speeds forward to	25.2 mph
Wt. on rear wheels	7,700 lb	Reverse to	3.2 mph
Blade pressure	6,450 lb		

Fully Equipped as Follows: Twelve-volt electric generator, battery, two white headlights, one red combination rear and stop light, muffler, 10-ft by ⅝-in. hydraulically shiftable moldboard, 6-valve control group, four 8.25-20 (6 ply) rear and two 8.25-20 (6 ply) front pneumatic tires with regular tubes, front wheel lean, power circle turn, hydraulic scarifier, all-steel cab.



Model D Diesel Special

POWER-CRATER is an Allis-Chalmers trademark

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

Shock and vibration are absorbed by this Gates Vulco Rope Drive on the ball mill in a New York rock crushing plant, saving over $600 a year in maintenance costs. Management gives credit to the resiliency of the Gates Vulco Ropes and to their concave sides for the many years of dependable service they have given.

concave sides lengthen V-belt life ...cut costs

Hundreds of plants that keep track of V-belt drive costs know this: Gates Vulco Ropes . . . the V-belts with *concave sides*...wear much longer and *cost less per year of service.*

Here is the interesting reason why:

When a Gates V-belt bends around the sheave, the *precisely-engineered* concave sides (Fig. 1) fill out and become straight. Thus the sides of the belt make full, uniform contact with the pulley (Fig 1-A).

Naturally, uniform contact distributes the wear *evenly*. And *even* wear means *longer* wear.

Longer wear saves not only on replacement costs; it also saves the cost of down-time... keeps equipment producing.

Simple test proves value of concave sides

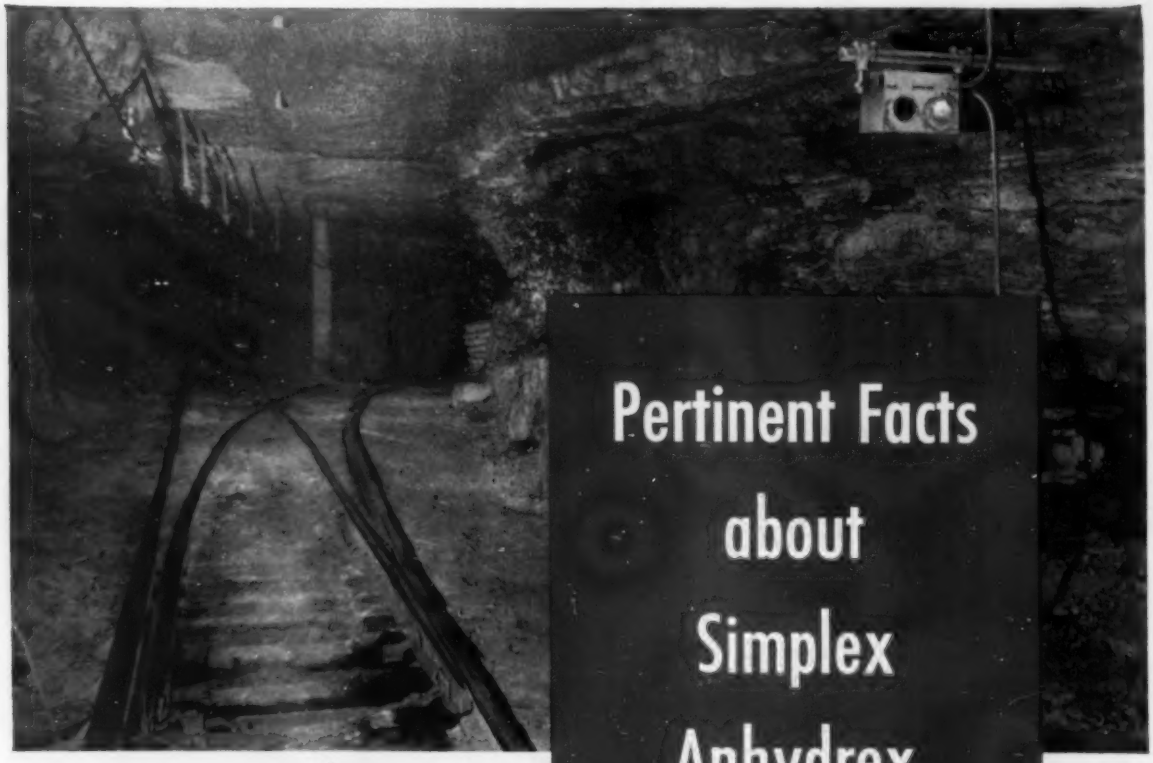
Take a straight-sided V-belt (Fig. 2) and bend it. Feel the sidewalls of the belt bulge out as the belt bends. You see immediately that the bulging sides prevent uniform contact with the pulley (Fig. 2-A). Uneven contact causes faster wear...increases your drive replacement costs.

Let the cost-saving longer life of Gates Vulco Ropes contribute to *your* profits. Specify Gates Vulco Ropes—the V-belts with concave sides (U.S. Patent 1813698). The Gates Rubber Co., Denver, Colorado—*World's Largest Maker of V-belts.*

Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

TPA-54B

GATES VULCO ROPE DRIVES



Pertinent Facts about Simplex Anhydrex Mine Signal Cables

Anhydrex insulation was built to do away with lead sheaths on cables. It has given many years of service in wet mines. No Anhydrex-insulated cable has ever failed because of water absorption.

Anhydrex insulation resists heat and oxidation. This means exceptionally long life for Simplex Mine Signal Cables. These cables have a low power factor and a low dielectric constant.

Simplex Mine Signal Cables have an extraordinarily tough neoprene jacket for protection against acids, flame, oils, cuts, bruises and rough treatment during installation.

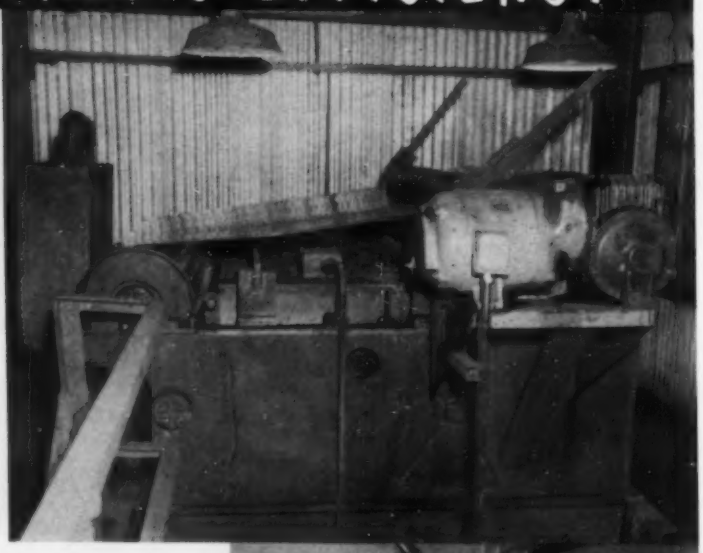
Simplex

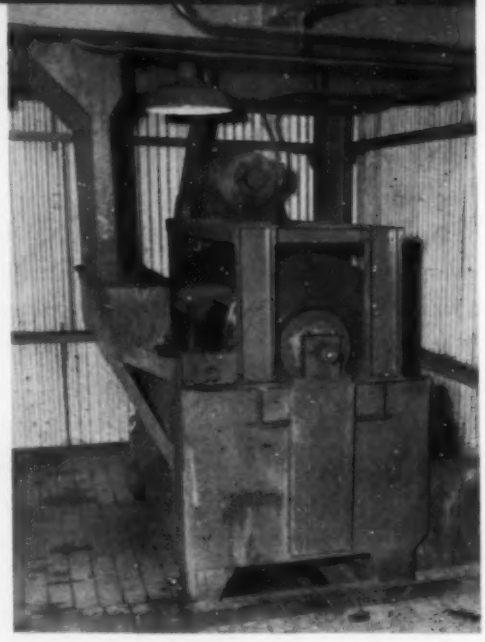
If you need help in solving your signal cable problems, call a Simplex representative in the Simplex office nearest you. Or write to the address below for more detailed information about Simplex-ANHYDREX Mine Signal Cables.

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

99.855% MAGNETIC EFFICIENCY

...record made with a pair of DINGS *Heavy Media* SEPARATORS





THE efficient pair of Dings Heavy Media Magnetic Separators shown here is turning out a record over-all media recovery of 99.855 per cent in a large standard heavy media plant treating Alabama coal.

The primary separator in this plant is a standard 48" Dings submerged belt unit, treating approximately 500 gpm of screen rinse water. Total solids and magnetic content are typical of slurries being treated in most coal plants today. Tailings from this primary unit drop down to the next floor for re-treatment.

The secondary separator is a 30" dia. x 48" magnet width wet drum unit of economical permanent magnetic construction, a pioneer Dings development. This secondary unit provides dependable protection against high media losses resulting from unpredictable power interruptions.

It is important to note that while the primary submerged belt separator does a highly efficient job by itself, the secondary drum unit shows very good secondary recovery performance.

Here are the outstanding results of these two Dings Heavy Media units:

PRIMARY FEED (500 gpm approx.)	*SECONDARY FEED*
15.0% TOTAL SOLIDS	9.0% TOTAL SOLIDS
36.5% MAGNETIC SOLIDS (0.456# per gal.)	0.18% MAGNETIC SOLIDS (0.0014# per gal.)
TAILINGS ... 0.0014# per gal.	TAILINGS ... 0.00066# per gal.
RECOVERY ... 99.69%	RECOVERY ... 52.86%
OVER-ALL MAGNETIC EFFICIENCY ... 99.855%	

Write for full details covering Dings Magnetic Separators for Coal and Metal Mining Service.

DINGS MAGNETIC SEPARATOR CO.
4719 W. Electric Ave., Milwaukee 46, Wis.
Magnetic Separation Leaders for over 50 Years

Dings

HM255

GM DIESEL
CASE HISTORY No. IA3-15

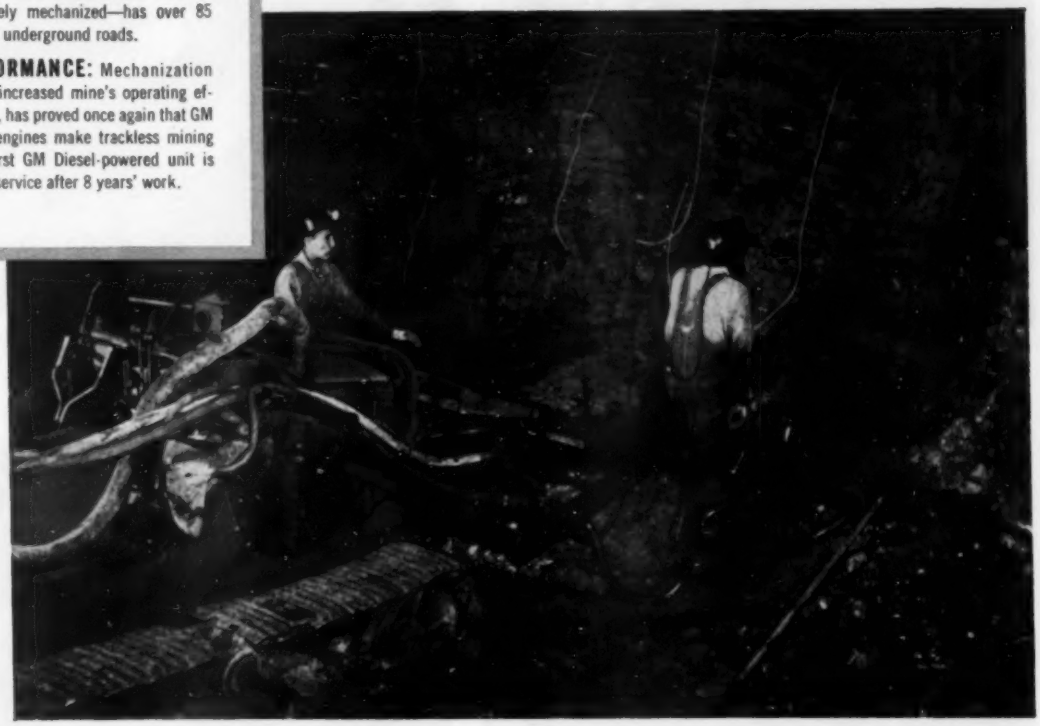
OWNER: Eagle-Picher Company, Miami, Oklahoma.

INSTALLATION: 50 GM Diesel-powered ore haulers, shovels, drills and personnel cars in zinc mine. Mine is completely mechanized—has over 85 miles of underground roads.

PERFORMANCE: Mechanization greatly increased mine's operating efficiency, has proved once again that GM Diesel engines make trackless mining pay. First GM Diesel-powered unit is still in service after 8 years' work.

8 years underground

and still going strong



TO A General Motors 2-cycle Diesel engine "home" is where the job is. That's why you'll find both underground and surface (strip) miners specifying GM Diesel power for their mines.

In the Eagle-Picher underground mine, GM Diesel engines equipped with exhaust scrubbers keep production on the move.

And in both deep mines and strip mines GM Diesels help move more tons at less cost. Their 2-cycle operation with power at every piston downstroke means faster acceleration, less time spent per haul trip or bucket swing. What's more, you can run a GM Diesel for a lifetime because all parts and components are easily replaced.

Eagle-Picher executives say the local GM Diesel distributor was "invaluable" in working out some of their power problems. Back of the low-cost performance of GM Diesels *everywhere* stands a network of distributors ready to give you service and fast delivery of low-cost parts. These GM Diesel distributors are power experts. Call the one nearest you today for details on GM Diesel power for your mine.

DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICHIGAN
Single Engines . . . 30 to 300 H. P. Multiple Units . . . Up to 893 H. P.

VISIT GENERAL MOTORS POWERAMA Gala Celebration of 100 Million GM Diesel Horsepower—Lake Shore South, Chicago—Aug. 31st through Sept. 25th

NEW JERSEY IRON-ORE MINE REPORTS:

"Du Pont MS Delay Caps give improved fragmentation in long-hole blasting"

1, **MAKING A PRIMER** with Du Pont MS (millisecond)* Delay Electric Blasting Cap in 1½ x 16 Gelex #1 dynamite. This northern Jersey iron-ore mine uses MS Delays in both shrinkage stoping and long-hole work.

2, **LOADING PRIMER** into long hole. In this type work, use of MS Delay Electric Caps virtually eliminates cutoffs and greatly decreases overbreak. Damage to walls or ribs is minimized, as is dilution of the ore.

3, **BLASTER CONNECTING** the round. These short-interval delay caps give improved fragmentation . . . materially reduce vibration and smoke . . . allow greater efficiency in use of dynamite.

4, **FIRING BLAST** with a Du Pont CD-48 Blasting Machine. Working as a "team," MS Delay Caps and other Du Pont products give greater blasting efficiency . . . more safety. Why not try a Du Pont "team" in your mine?

You can get further information on MS Delay Electric Blasting Caps or any other member of the Du Pont blasting "team" from the Du Pont representative in your area. You'll be glad you did. E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

*"MS" Delays with copper or iron wires are available in following delay periods: MS-25, -50, -75, -100, -125, -150, -175, -200, -250, -300, -350, -400, -450, -500, -600, -700, -800, -900, -1000

DU PONT EXPLOSIVES

Blasting Supplies and Accessories

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Capitol Concentrates

Bill To Extend Domestic Mineral Purchases Is Attacked In Senate

It appears that S. 922, the Senate bill which would have extended the government's mineral purchase programs 10 years beyond the present 1958 termination date, will be shelved for the remainder of the session at the instance of the Senate Democratic policy committee. The decision came after a vicious attack on the bill by Senator Williams of Delaware, who called it the "boldest raid on the Treasury in years." The attack, according to Washington observers, was probably instigated by the Office of Defense Mobilization, headed by Arthur Flemming, who furnished Williams with figures (dubious figures, to say the least) on the presumed cost of the extended program.

The bill had a large bi-partisan sponsorship with prominent Republicans on the list and was reported on favorably and unanimously by the Senate Interior Committee. Several Senators have commented that the bill could have passed the Senate had immediate action been taken when it was reported to the floor. An immediate vote on calendar call was blocked by Senator Millikin of Colorado at the instance of the Interior Department, giving the various agencies time to muster their forces and cause a series of delays, culminating in the Williams speech, which apparently killed the bill.

Williams, no doubt, forgot the many subsidies of one kind or another, including fast tax amortization, that DuPont has enjoyed from time to time. The welfare of the West does not concern him.

Anyway, the Senate Interior Committee made a good try to put the strategic and critical domestic mining industry on a firm, long-range basis. Members of the committee have commented that they did not expect S. 922 to be passed by both Houses in the form in which it was reported, but that they did hope it would form the basis for a reasonable compromise with the Engle Bill (H.R. 6373) which does not extend the present programs at all. There undoubtedly is a greater chance the House will pass the Engle bill as it has the quasi-blessing of the Interior Department (as the lesser of two evils) although the Office of Defense Mobilization does not like that bill either.

It will be interesting to see what the Senate does with the Engle bill should the House pass it in its present form. After having their ears knocked down through the good offices of Dr. Flemming and Senator Williams, the Senators may be chary of trying to get a stronger bill. After all, one slice is better than no loaf.

• Statements Are Inconsistent

A neat example of government inconsistency came to light a short time after ODM cut off the columbite-tantalite purchase program with the comment that the objectives had been met (though few people believed it). ODM Director Arthur S. Flemming went before the Senate Banking and Currency Committee and stated that supplies of certain items, including columbium, are still inadequate to meet the demands of a full-scale war.

• Silver Purchase Act Is Under Attack

A determined fight to repeal the Silver Purchase Act is being made at this session of the Congress and manufacturers of silverwares have marshalled their forces in a most formidable way. In the closing days of June, Senator Fulbright, chairman of the Senate Banking and Currency Committee, was high-pressured by Senator Green of Rhode Island and others into calling a hearing on the various repeal bills now before the committee.

Such bills are dropped into the hopper each year, but generally constitute no great threat, though Westerners watch them carefully. It is a well-known fact that the silver content of many base-metal mines is the difference between profit and loss and a reduction in the silver price might cause them to close down.

Getting wind of the seriousness of the situation, Senators from western states signed a round-robin letter to Senator Fulbright asking that the proposed hearings be postponed. They hope this delay will kill the move to repeal the Silver Purchase Act for the remainder of the present session of the Congress.

• Fluorspar Producers Are In Tight Spot

The reasoning of the United States Department of the Interior, when it comes to the economics of the domestic minerals business, "passeth all understanding."

There is a pending bill by Senator Dirksen to place an import quota restriction on fluorspar, restricting imports to 25 percent of the domestic consumption. It is a well-known fact that the fluorspar industry is in dire distress, yet in a recent report on the Dirksen bill the Interior Department recommends that the bill be not enacted. If it had been the State Department's recommendation it would be understandable, but Interior is supposed to look out for our domestic interests.

Because the fluorspar industry has filed a brief with the Office of Defense Mobilization for relief under Section 7 of the Trade Agreements Act and because ODM expects to buy some fluorspar for the stockpile (at the market?), says Interior, "we believe no legislation of this character is now necessary." The implication is that the industry is sure to get relief under the Trade Agreements Act—a more than dubious eventuality, judging from past performance—and that stockpile purchases will be great enough and at a sufficient price to support domestic producers, which would be a great change in ODM policy which generally dictates "at-the-market" purchase prices.

QUICK SHIPMENT

COLUMBIAN BOLTED STEEL MINING EQUIPMENT

AGITATORS •

THICKENERS • SOLUTION TANKS • ORE BINS, ETC.

No costly delays. Your order is handled in record time by an expert staff of engineers and designers. Then it is fabricated in one of the best equipped manufacturing plants in the Mid West, with modern presses especially designed for the purpose.
Lower your costs with Columbian Mining Equipment for permanent installation, yet portable if change in location is necessary. Standard construction for domestic use or for export by ocean freight. Special if for export via mule-back or airplane to final destination. Order from distributors listed below—or write direct for complete facts.

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Avenida Ejercito Nacional 438, D
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Half Century
Experience in

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Full details on request

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DRILLING COMPANY

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Monticello, Utah — Telephone 2881 and 9184

One very interesting statement in the report, which is signed by Assistant Secretary Aandahl is: "Even in those instances where it is necessary to maintain reasonable levels of domestic production for national defense purposes, the President has indicated that direct means normally should be used rather than tariffs or quotas."

That being the case, it seems like a waste of time for the fluorspar industry to apply either to the Office of Defense Mobilization or the Tariff Commission for help. If, by odd chance, either or both of these agencies should show a favorable attitude, (and the Tariff Commission has not), the White House most certainly would reverse them. And the "direct means" of stockpile purchases at the best would only be a temporary stopgap.

• Senator Malone Filed Minority Report

The only dissenting voices so far on the multiple use of the surface of mining claims bill (S. 1713) are those of Robert S. Palmer of the Colorado Mining Association and Senator George W. Malone of Nevada. The latter filed a minority report as a member of the Senate Committee on Interior and Insular Affairs, which committee reported favorably on the bill.

The burden of Senator Malone's objection is that the mining law of 1872 furnishes enough authority to the government to remove offending claim locators and that S. 1713 is a step toward government control of mining by means of a leasing system. He stated: "The amended act opens the door for continual interference by government officials."

In the opinion of Senator Malone the hearings on the bill did not express the real opinion of the claim locators and owners. "It is abundantly clear," his report continued, "that hearings should be held in the mining areas of this nation before any action is taken, since no real miners were heard and the mining associations of the several states were clearly intimidated through threats of more severe legislation unless they accepted the proposed legislation as written."

The Senate, on June 28, passed the bill by voice vote and the measure is in Senate-House conference committee to iron out the differences in the Senate and House versions.

COMING CONVENTIONS

September 8 and 9, 1955. IDAHO MINING ASSOCIATION. Sun Valley, Idaho.

September 29 and 30, and October 1. Annual Meeting of the New Mexico Mining Association and INTERNATIONAL MINING DAYS, Paso del Norte Hotel, El Paso, Texas.

October 3 through 6, 1955. Twenty-fifth annual meeting SOCIETY OF EXPLORATION GEOPHYSICISTS, Shirley Savoy Hotel, Denver, Colorado.

October 5 through 8, 1955. Rocky Mountain Minerals Conference, AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS. Fall meeting of Minerals Beneficiation Division. Salt Lake City, Utah.

October 10 through 13. Annual meeting AMERICAN MINING CONGRESS, Las Vegas, Nevada.

October 13, 14, and 15. Fourth annual DRILLING SYMPOSIUM, University of Minnesota Center for Continuation Study, Minneapolis, Minnesota.

October 21, 1955. Second Alumni Reunion. MINNESOTA SCHOOL MINES AND METALLURGY, Minneapolis, Minnesota.

November 7, 8. Western Governors' MINERAL POLICIES CONFERENCE, Sacramento, California.

November 8 through 11, 1955, Annual Meeting AMERICAN COUNCIL OF INDEPENDENT LABORATORIES, INC. Westward Ho Hotel, Phoenix, Arizona.

December 10 through 16, NUCLEAR CONGRESS and ATOMIC EXPOSITION, Public Auditorium, Cleveland, Ohio.

Now...

from Caterpillar

...a major

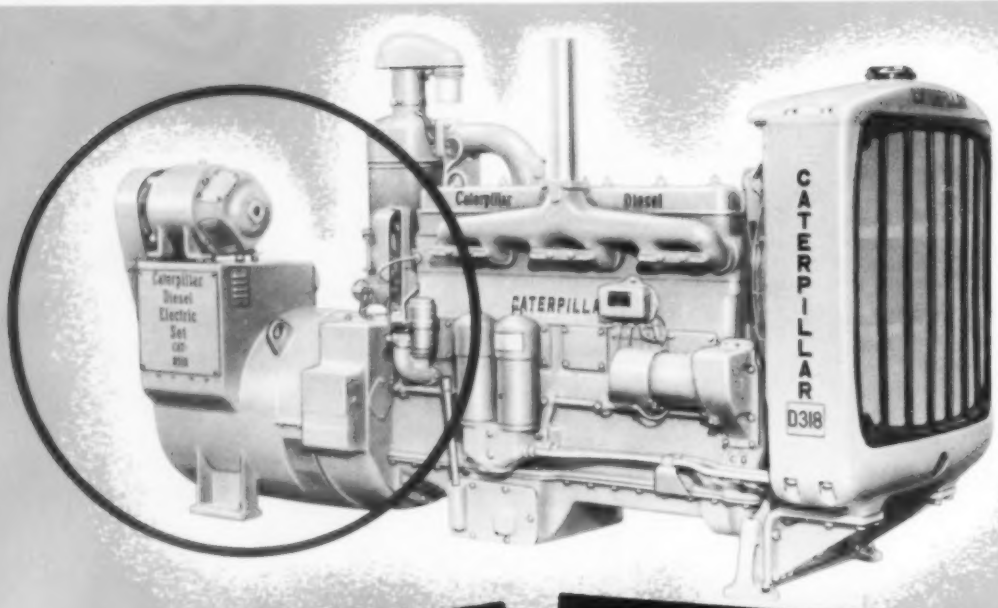
development

in

MODERN ELECTRIC POWER

The new

CATERPILLAR

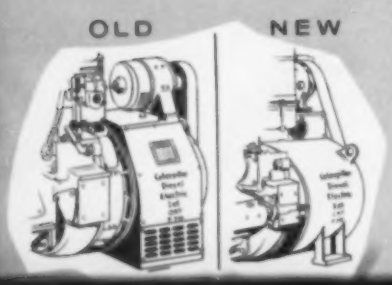


Nothing like it for simple operation, flexible application, compact power, rugged construction, long life and ease of maintenance.

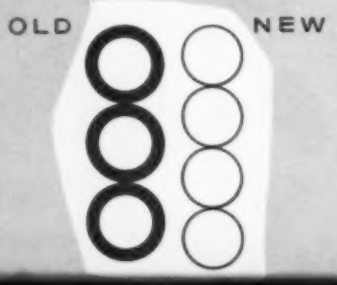
Heart of the new line of Cat Diesel Electric Sets, providing in one package the best features of self-regulated and externally-regulated generator plants—you get more for your money.

Easily paralleled with other generators now in use.

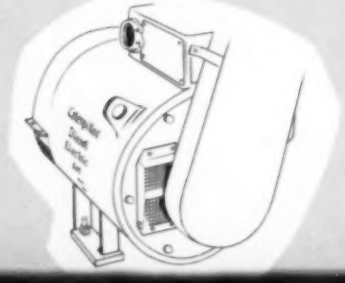
There is a big difference in size between the old and new Caterpillar Generators.



New insulation permits more compact design—exaggerated comparison in illustration below.



New design saves space. Leads can be taken from side, back or top without affecting machine width.



GENERATOR

Here is a new concept in generators – an advance that stems both from Caterpillar research and practical experience in the field of electric power.

Combining latest developments in design, materials and production, it brings to Caterpillar's new line of Diesel Electric Sets the efficiency of the externally-regulated set in a self-regulated set–you get more for your money.

These rugged power packages provide you with many new advantages. Here are a few of many features that add up to a new standard of efficient, economical performance:

- **Close regulation of voltage—no load to full load.**
- **Easy to start—require no operating adjustments. Anyone can run them.**
- **Extremely compact—big electrically, packing more power in smaller space than old style units.**
- **Easily paralleled with other generators now in use.**
- **Like all Caterpillar-built equipment—100% backed by Caterpillar.**
- **Sold and serviced by one reliable source—your nearby Caterpillar Dealer.**

Whatever your power requirements, it will pay you to look into the new Cat Diesel Electric Sets with their advance-design generators. Get the full facts about them from your Caterpillar Dealer.

MAJOR ADVANTAGES OF THE NEW CAT GENERATORS

1 **MATCHED TO ENGINE PERFORMANCE.** Each Cat Generator is designed and built to exactly match the Cat Engine powering it, assuring maximum efficiency in a simple, complete package.

2 **SELF-REGULATING, WITH CLOSE VOLTAGE REGULATION.** Designed to meet the needs of applications now served by self-regulated or externally-regulated generators, this new generator provides steady voltage from no load to full load.

3 **ADJUSTABLE FOR SPECIAL CONDITIONS.** During initial installation, the terminal voltage and voltage "droop" can be adjusted to meet the special conditions of the application. After that, the adjustments are locked and no further adjustments are necessary.

4 **EASY TO INSTALL.** No complicated switchgear or external voltage regulators are needed.

5 **VERSATILE IN APPLICATION.** Easily paralleled with other generators now in use.

6 **SMALL AND COMPACT.** Occupy less space than other generators. A reduction in frame size, close coupling, top-mounted exciter results in a shorter over-all package length.

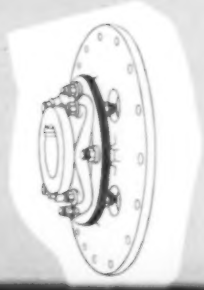
7 **BIG ELECTRICALLY.** Motor starting ability — capacity to handle the surge of heavy loads.

8 **EASY TO MAINTAIN.** Heavy-duty, single-bearing, close-coupled construction. The single bearing is easily accessible and is lubricated from an oil reservoir that requires filling only once a year.

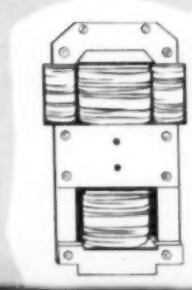
9 **RUGGEDLY CONSTRUCTED.** Heavy-duty, laminated pole rotor for improved operation and increased rotor life.

10 **DESIGNED FOR LONG LIFE.** Built to match the long life of the Caterpillar Engine powering them.

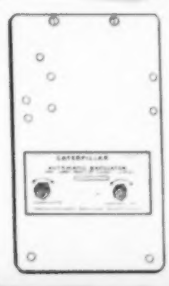
Disc-type coupling and single-bearing design save space. Single bearing is easily accessible.

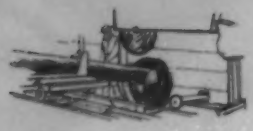
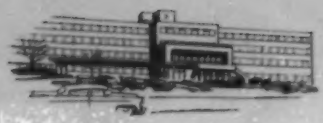


The "regulator" of the Caterpillar Generator. No moving parts — compact — reliable.

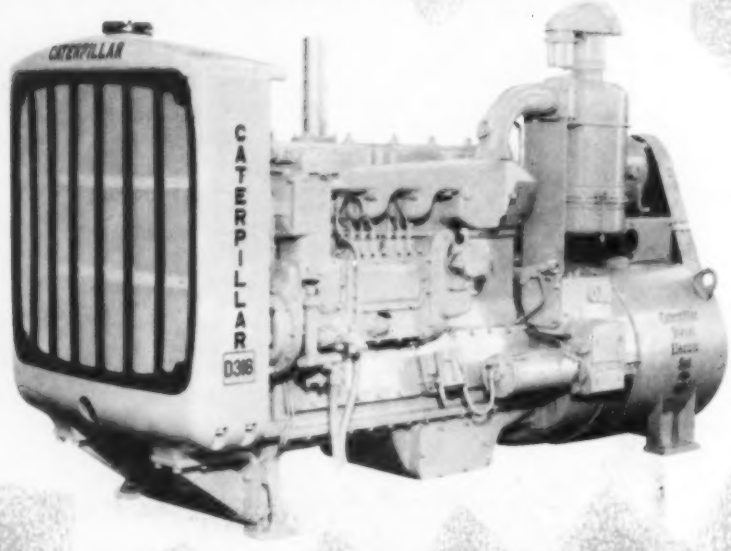


The control panel—adjustments locked at installation. No further attention required.



The new CAT* Generator



. . . another example of Caterpillar leadership in action

In 1939, Caterpillar introduced the first Cat self-regulated Electric Set.

At the time, this was a new concept in diesel-electric power.

Like most new developments, it had to win acceptance against "old, hidebound, traditional prejudices and practices."

It won acceptance — quickly and with outstanding success!

Just look at the record: since 1939, thousands of Cat Electric Sets have delivered long, reliable, economical service in widely different applications in every corner of the world. Sets with many thousands of hours of profitable operation are not uncommon. Many with more than 100,000 hours on their meters are still in use and going strong.

No matter how old they grow, not a single one ever becomes a "parts orphan." Like every Caterpillar-built machine, genuine Cat parts will be available as long as you have a need for them.

Now Caterpillar introduces another new concept in diesel-electric power—a new and better generator, heart of the new line of Caterpillar Diesel Electric Sets.

Like that 1939 "new concept of diesel-electric power," this is also backed 100%.

New design, new materials and new production techniques have made it possible for you to get more for your money in the new power packages.

See your Caterpillar Dealer about the new line today!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

August 1955

INTERNATIONAL PANORAMA

OKA, QUEBEC—Molybdenum Corporation of America and Kennecott Copper Corporation will jointly develop a columbium-tantalum ore deposit at Oka. Kennecott acquires a 51 percent interest in Molybdenum's rights on the property.

ST. LOUIS, MISSOURI—American, Zinc Lead & Smelting Company has purchased a 14.5 percent interest in the new Uranium Reduction Company which is building a major uranium processing mill at Moab, Utah.

DENVER, COLORADO—The Murchison brothers of Dallas, Texas have a major interest in the Thornburg uranium mine near Gunnison, Colorado and reportedly plan to build a mill.

LOS ANGELES, CALIFORNIA—Hycon Aerial Surveys, Inc. has signed an airborne exploration contract with a "secret" mining company. It is reported to include the first commercial use of the new Varian Associates total intensity magnetometer.

JUNEAU, ALASKA—Uranium prospecting in the Territory has reached a new peak following discovery of commercial grade mineralization on the south end of Prince of Wales Island. Radioactivity was first discovered by aerometric surveying.

COLUMBIA, TENNESSEE—International Minerals & Chemical Corporation has purchased the Tennessee Valley Authority's Godwin phosphate plant for $635,000.

WASHINGTON, D.C.—The ODM has granted Olin Mathieson Chemical Corporation a fast tax write-off on a $74,000,000 primary aluminum plant which would produce about 60,000 tons a year.

ELISABETHVILLE, BELGIAN CONGO—The Belgian government and the United States government have signed an agreement under which the United States has an option to buy 90 percent of the Congo's uranium and thorium through 1957, and 75 percent through 1969.

FERNANDINA BEACH, FLORIDA—The Union Carbide and Carbon Corporation is sampling titanium-bearing sand deposits on Amelia Island off the northeast coast of Florida. Union Carbide's subsidiary, Electro Metallurgical Company is building the world's largest titanium sponge plant at Ashtabula, Ohio.

MOUNT DAVIES, AUSTRALIA—Reports here indicate that International Nickel Company of Canada will finance exploration and development of the nickel deposit. A large area in both Western Australia and South Australia will be explored.

SAN FRANCISCO, CALIFORNIA—Purchase of lead and zinc under the government stockpiling program which started in June 1954 totaled 136,500 tons of domestically mined lead and 181,430 tons of domestically mined zinc through 30 June 1955.

GRANTS, NEW MEXICO—New Mexico & Arizona Land Company has concluded an agreement with Tide Water Associated Oil Company permitting Tide Water to lease 250,000 acres of land for uranium exploration.

MOAB, UTAH—Moab Mines, Inc. has purchased a mercury mine in Mineral County, Nevada.

MONTREAL, QUEBEC—Canadian Javelin Ltd. will sell 2,000,000 to 3,000,000 tons of iron ore yearly to German steel mills from its Lake Wabush deposit. The German firm of Klockner-Humboldt-Deutz A.G. will build a concentration plant at Lake Wabush, and shipments to Europe are to start in 1957.

GLOBE, ARIZONA—The Inspiration Consolidated Copper Company has purchased the Riviera Mine's interest in the Christmas mine in southern Gila County, 40 miles from Globe.

ROSICLAIRE, ILLINOIS—The United States government through the GSA has offered to buy substantial tonnages of 60 and 70 percent fluorspar, at the market price. Purchases are scheduled for the rest of the calendar year.

OMM Ready To Take Over Metals, Minerals Duties

Tentative plans for putting into operation the Office of Minerals Mobilization have been completed by the United States Department of the Interior. Headed by Spencer S. Shannon, the group will carry out duties related to metals and minerals, formerly handled by the Office of Defense Mobilization.

Specifically, the functions include: responsibility for the development of preparedness measures for a comprehensive list of metals and minerals; recommendations for expansion goals and obligation bases; development of regulations for operation of metals and minerals industries under mobilization conditions; and assistance in planning for stockpiling.

Rare Metals Ready To Start Production

The last of the new equipment ordered by Rare Metals Corporation of America for its Nutmeg mercury mine east of Weiser, Idaho arrived in July. Initial production is scheduled to start this month.

Mining will be by open pit on ore bodies delimited by surface drilling. The strip ratio will be low and, in several instances, the ore bodies come very close to the surface.

The Nutmeg was first discovered in 1936. It was eventually developed by the Idaho Almaden Mines Corporation, who operated the mine until the low mercury price forced its closing in 1942.

Rare Metals is a subsidiary of El Paso Natural Gas Company.

Canadian Firm To Mine Iron Ore for Germany

Canadian Javelin Ltd. and the German firm of Klockner-Humboldt-Deutz A.G. have concluded an agreement which provides for shipment of 2,000,000 to 3,000,000 tons of iron ore yearly to German steel mills starting in 1957. The iron ore will come from Canadian Javelin's Lake Wabush deposit.

The German firm has agreed to build a plant at Lake Wabush. Initial capacity will be capable of handling 3,000,000 tons over a six-month period. A 42-mile spur line will be built to connect the deposit with the Quebec North Shore & Labrador Railway.

Negotiations are reportedly under way with steel interests in other nations aimed at shipments to Italy of 600,000 to 1,000,000 tons, to the Low Countries of 500,000 tons, and other countries (including Austria) of 300,000 tons. Three main groups representing 15 industrial firms participate in the German contract. They are the Rhstoffhandel group, the Erzkontor group, and Huttenwerk Oberhausen.

SEMI-PORTABLE screening plant can be dismantled in 15 minutes, and consists of hopper, conveyor, trommel and truck.

How A Small Miner Makes 0.15 Percent Tungsten Pay

Tungsten-bearing material which heretofore has been looked upon as valueless has been turned into government specification concentrates at the Lakewood mill in Boulder County, Colorado. Two Colorado men, by revising what was standard operating practice in the district, can now produce a saleable product from ore of only 0.15 percent WO_3. They have obtained leases on three tracts of land in the area, and can operate profitably on a mill feed made up of surface float and unmined low-grade ore left near the surface of previous operations.

The operators of the project, Harrison S. Cobb and Tom Weldon, were originally gold miners, each with a record of extensive production in previous years. During World War II both Weldon and Cobb were among the major tungsten producers of the district. But with the onset of the Korean War, and the demand for increased quantities of tungsten, these operators were very diffident about reentering tungsten mining, because they were well acquainted with the ever-present difficulty of finding more ore.

Tom Weldon, however, who was originally a saw mill operator with extensive experience in building and operating saw mills, conceived the idea that a concentrator could be constructed to handle successfully material which had been ignored and avoided by mine and mill operators throughout the history of the district. There was a lot of such material.

Big Ore Supply

Previous to 1942, both custom and company-owned tungsten mills had discouraged the delivery of ores with less than 2.0 percent WO_3 by offering only penalty prices for such ores. During World War II, the minimum acceptable grade was lowered to 1.0 percent, then to 0.8, with some ore being accepted as low as 0.5 percent. Custom mills at present will accept a certain amount as low as 0.5 percent ore, but mill operators still discourage the delivery of ore containing less than 1.0 percent tungsten. As a result, many individually owned "jig and table" mills have operated for short periods on ores running from just below 0.5 and up to 1.0 percent.

However, large quantities of mineralized rock were left in the mines, and in the prevalent float-bearing surface cover, rock which contained from 0.05 to 0.25 percent WO_3. If this material could be concentrated economically, there would be no problem of ore-supply for those engaged in the enterprise. As the Boulder tungsten district has always been characterized by long periods of looking for ore, between relatively short periods of mining, the opportunity for a plentiful ore-supply was very tempting indeed.

There were two problems in the way of a successful enterprise of this kind. The first was that of making a high-grade concentrate. Low-grade ore had been milled before, but turned into only a low-grade concentrate. The second problem was phosphorus. In many cases, with low-grade ore, the phosphorus, which seems to occur in the country rock adjacent to the veins, would be concentrated along with the tungsten, so that the concentrate would be assessed high penalties on the phosphorus contamination.

Mr. Weldon was certain that these problems would not present any great difficulty, so a decision was made to set up a pilot plant for the 1951 summer season. This plant was constructed, and about 2,000 tons of ore were milled during the summer and fall. The design of this plant did not depart from traditional district practice; in fact, it went only half as far. Instead of the customary "jig and table" mill, this turned out to be simply a "jig" mill.

Such a satisfactory recovery was made during 1951 that plans were made to construct a plant that would treat 50 or 60 tons a day. Because numerous changes in jig design were indicated in order to increase ca-

pacity, recovery, and to make a smoother-flowing circuit, it was decided to build every unit to be used in the mill.

Four Jigging Circuits

Construction of the concentrating units was begun just after February 1, 1952, with a goal of mill in operation by June 1. The entire construction crew consisted of Tom Weldon, saw mill superintendent; Harrison S. Cobb, mine operator; C. R. Jones, hard-rock miner; and A. Ambrose, coal miner. These four men built the machinery, made terraces at the mill-site, set the machinery, erected the mill building, installed the water lines, the electric system, built the ore bins, and made the first day's run of ore in the 18th day of May, 1952. Instead of a 60-ton per day maximum capacity, the plant has proven to have a capacity of 90 tons per one-shift day.

Ore is dumped into a 70-ton receiving bin, which is kept filled, as far as possible, so that in case of a breakdown at the mine, there will be almost a day's run on hand. One-quarter of the bin is partitioned off so that test runs may be made through a single circuit whenever desired. There are four complete circuits in the plant, and each circuit handles over two tons of ore per hour. An individual circuit consists of a belt feeder, one Hartz type "bull" jig used as a classifying-cleaning unit, and two Hartz type pulsating jigs as cleaning units. Each jig has only two cells.

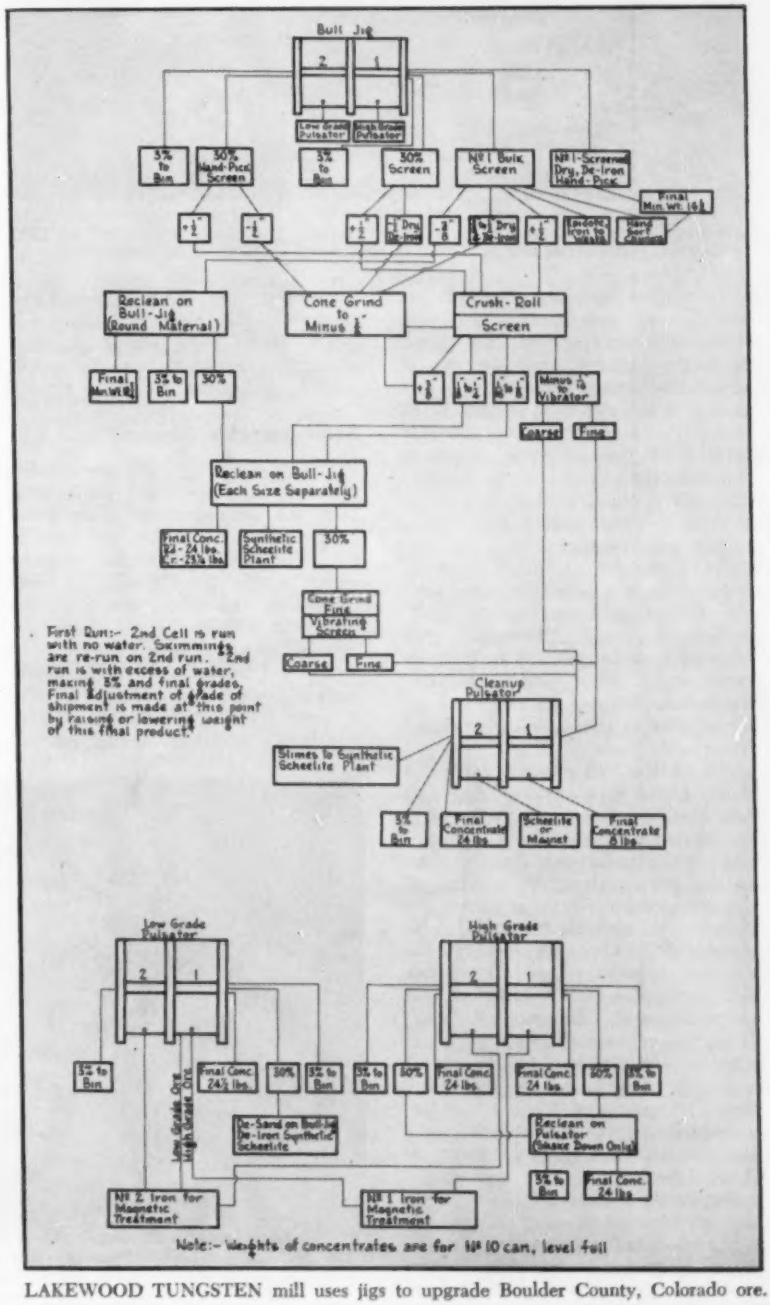
Four reciprocating shaker feeders were first installed, but were so unsuccessful, due to moisture in the ore, that immediate reversion to the pilot-mill method of hand feeding was made. In using this system, two feedmen were required. Each man fed two circuits, using water-pressure probes. This, of course, was expensive, so at the beginning of the 1954 season, four ratchet-type belt feeders were built and installed. This resulted in an immediate saving of $250 per month, beside the added advantage of a steady feed resulting in an increased tonnage.

Two Compartment Bull Jig

Each belt-feeder discharges into a launder, where a stream of water carries the ore into the first compartment of the "bull" jig. Everything minus-1¼-inch, unclassified, is poured into the "bull jig." This classifying jig is 18 by 30 inches in each of two compartments. The first, or "high-grade" cell collects the higher grade coarse concentrate, from 1¼ down to 3/16 inch, all of which remains on the screen. The fine ore particles go through the bed, through the screen, into and through the hutch, and to the No. 1 pulsating jig. The lighter ore washes over into the second cell, which accumulates the lighter, more "horny" ore, the "half-breeds," and the facey pieces. The fines of this type also pass through the bed, screen, hutch, and to the No. 2 pulsator.

The pulsating, or cleaning, jigs are similar in design to the roughing jigs, but are smaller, each compartment being 12 by 16 inches. Concentrates above 18-mesh in size are retained in the bed, while those below 18-mesh pass through the bed and screen, and are held in the hutches.

The overflow from the pulsators was originally passed over a battery of four tables, but in two seasons' operation, the few slime values recovered did not pay for replacing the canvas on the tables, so the rag plant was removed.


Bull Jig
2
1
Low Grade Pulsator
High Grade Pulsator
3% to Bin
30% Hand-Pick Screen
3% to Bin
30% Screen
No 1 Bulk Screen
No 1-Screened Dry, De-Iron Hand-Pick
Final Min. wt. 16 lbs.
Reclean on Bull-Jig (Round Material)
Cone Grind to Minus ¼"
Crush-Roll Screen
Final Min. wt. 8 lbs.
3% to Bin
30%
Minus ¼ to Vibrator
Coarse
Fine
Reclean on Bull-Jig (Each Size Separately)
Final Conc. 24-24 lbs. or 25% lbs.
Synthetic Scheelite Plant
30%
Cone Grind Fine Vibrating Screen
Coarse
Fine
First Run:- 2nd Cell is run with no water. Skimmings are re-run on 2nd run. 2nd run is with excess of water, making 5% and final grades. Final adjustment of grade of shipment is made at this point by raising or lowering weight of this final product.
Cleanup Pulsator
Slimes to Synthetic Scheelite Plant
3% to Bin
Final Concentrate 24 lbs.
Scheelite or Magnet
Final Concentrate 8 lbs.
Low Grade Pulsator
High Grade Pulsator
3% to Bin
Final Conc. 24½ lbs.
30%
3% to Bin
3% to Bin
30%
Final Conc. 24 lbs.
Final Conc. 24 lbs.
30%
3% to Bin
Low Grade Ore
High Grade Ore
De-Sand on Bull-Jig De-Iron Synthetic Scheelite
Reclean on Pulsator Balance Down Only
3% to Bin
Final Conc. 24 lbs.
No 2 Iron for Magnetic Treatment
No 1 Iron for Magnetic Treatment
Note:- Weights of concentrates are for 18" 10 can, level full

LAKEWOOD TUNGSTEN mill uses jigs to upgrade Boulder County, Colorado ore.

57 PERCENT WO_3 is produced from rock which is barely mineralized at the Lakewood mill in the Boulder County tungsten district. The plant, constructed in 1952, treats surface float and material once considered waste by previous operators.

In normal operation, the bull jigs are cleaned once a day. From the first cell, two products are taken from the bed. A small amount of specification-grade concentrate is separated, which assays 55 percent WO_3, and a large amount of what is loosely termed "30 percent grade" is sent to the recleaning circuit. From the second cell is taken a small amount of the "30 percent grade," which goes to the recleaning circuit.

From the No. 1., or high-grade, pulsator beds is taken the same relative grades as from the first "bull" jig cell. The No. 2, or low-grade, pulsator beds make material for retreatment only. The various pulsator hutches make products ranging from 60 percent in grade, to a 5 percent irony concentrate.

All of the "30 percent grade" is crushed and ground in a ring and cone sample grinder, and is rejigged in closed circuit, so that there is no appreciable loss through fine-grinding. In the final analysis, 80 percent of the recovered tungsten is above the government stockpile minimum of 55 percent WO_3. About 15 percent of the tungsten recovered is a 20 percent WO_3 product, which is sold to a local chemical plant, Tungsten Refining, Inc., for conversion into synthetic scheelite, so that this fraction, also, is finally above minimum specification. The remaining 5 percent of the recovered tungsten is in an irony concentrate with a tungsten content of about 5 percent.

Shipments are carefully controlled, and are blended to assay 57 percent WO_3, which is the economic optimum grade. If grades higher that 57 are made, a larger amount of 20 percent concentrate must be cut off and sent to the scheelite plant, at a lower sale price. Therefore, a higher grade of stockpile concentrate actually results in diminishing returns.

Semi-portable Screen Plant

Ore production machinery consists primarily of a screening plant. This plant was designed to be as small and lightweight as possible, so that it could be moved from mine to mine within a very short time. The units composing this plant are a tractor loader, a hopper, a conveyor, the trommel screen, and two trucks.

The T-6 International dozer-shovel gathers the ore-bearing material, lifts it, and pours it onto the 5-inch grizzly, the undersize falling into the hopper. A gasoline tractor was chosen on account of its ease in starting, and the comparative simplicity of engine maintenance on the job. The operating expense on the tractor is very low. Gasoline consumption is about one gallon an hour, and the engine oil is changed only once a year. The little tractor works almost constantly. Besides putting 120 tons of material into the plant each day, it must push up piles of ore, clear away trees, and shove the coarse reject piles away from the screen discharge and from the grizzly.

A hopper, such as is used in derrick delivery of concentrate in construction work, was re-vamped, mounted on legs, and crowned with the two-way discharge grizzly having 5-inch openings.

A 20-foot by 18-inch Cedar Rapids portable conveyor takes the dirt from under the hopper, and discharges it into the screen. The conveyor is driven by a three-horsepower air-cooled engine.

Locally Designed Screen

Every trommel screen which was available in the area was of such massive construction that moving it from place to place would have been entirely out of the question, and of course the cost of these monsters was beyond all reason. So, in self-defense, a screen was designed, and built in one of the local machine shops, for approximately $350, which weighs 500 pounds, complete with frame and engine. This screen is made of 1¼-inch mesh woven wire, welded on 21-inch rims. It is supported on rubber trunnions, all mounted on a four-legged angle-iron frame which will

NEW MILLING METHOD makes ore from low grade tungsten float beds, from float covered by waste during earlier operations, and from low grade left near the surface. This picture shows how surface cover, now used as mill feed, is stripped.

just clear a dump truck. The screen is turned by a two-horsepower, air-cooled engine.

The screening unit was built for the original pilot operation. The screen was seven feet in length. With two men shoveling into it, this size performed very well. But when the mechanical loader began to put five or six times as much material into the plant, it was necessary to cut the screening area by almost one-third, so the length of the trommel was shortened to five feet. This sounds like a paradox, but it became evident at once that with the increased load, the engine could not keep the screen turning. As practically all of the screening action took place in the first 18 inches, there was no loss of capacity after cutting off two feet of dead load.

The 1½-inch-mesh screen is used for those mines in granitic areas. In schistose parts of the district, ¾-inch mesh is more efficient, as large pieces of schist do not jig well. The ore in schistose zones appears to be more crystalline, higher grade, and softer, so that the values are in the finer sizes. The first 1½-inch screen, made with ¾-inch wire, screened over 22,000 tons of material before having to be replaced.

A three-man crew produces an average of 80 screened tons per day. One man operates the loader, one operates the plant, and the third man drives the two trucks alternately. If either the truck driver or the plant operator is ahead of the other, he inspects the coarse discharge for large pieces of ore, which he sorts out. Several tons are accumulated during a season.

Before leaving a site, or a "set," as it is called on the job, all coarse piles are spread very widely and thinly. For many weeks thereafter, they are hand-picked after every rain, which washes off dirt showing all ore very plainly.

In moving the plant, one truck, using the dump body as a hoist, picks the trommel screen up on its back, the loader picks up the hopper and places it in the other truck, and then ties on to the conveyor, and the whole group moves off in a procession. About 15 minutes is required to tear down, and about an hour to set up again.

Optimum Feed is 0.15%

One of the primary ideas in the construction of this plant was to recover all of the tungsten content possible, and to put it into a saleable product. Therefore, one goal of the operation was to treat an average mill feed as low as economically practical.

LOOKING OVER some of the specification grade tungsten concentrate produced at the Lakewood mill are A. B. Weldon (right) and Harrison S. Cobb (left). Changes in flowsheet practice and re-designed jigs make the use of low grade feed feasible.

It was soon determined that an average mill head of 0.15 percent WO_3 was the optimum feed for the plant. As the high-average grade of available ore is about 0.25 percent, some as low as 0.05 percent is included. This enables the operation to take practically all the tungsten in an area at one pass, thereby making it unnecessary for future operators to build other plants for treating lower and lower grade material.

Ore is made from low-grade float beds; from float which had been covered with waste from early mining operations; and from low grade which previous operators had left near the surface of the mines. Cobb and Weldon have limited leases on the three largest tracts of tungsten-bearing property in the Boulder district, namely, the Hetzer Mines tract, the Colorado Tungsten Corporation tract, and the Vanadium Corporation of America tract.

High Concentration Ratio

There are a number of miscellaneous facts which may be of interest concerning this operation. For one thing, the Lakewood mill seems to prove that most of the phosphorus is contained in the wall rock of the mines. Ores that are reputed to be high-phosphorus, have yielded no-penalty concentrates in this mill. The theory of the operators is that the ancient practice of crushing-grinding-concentrating has resulted in concentrating the phosphorus along with the tungsten. This improved system of concentrating-crushing-grinding-concentrating results in washing away the contaminants before the actual tungsten concentration takes place.

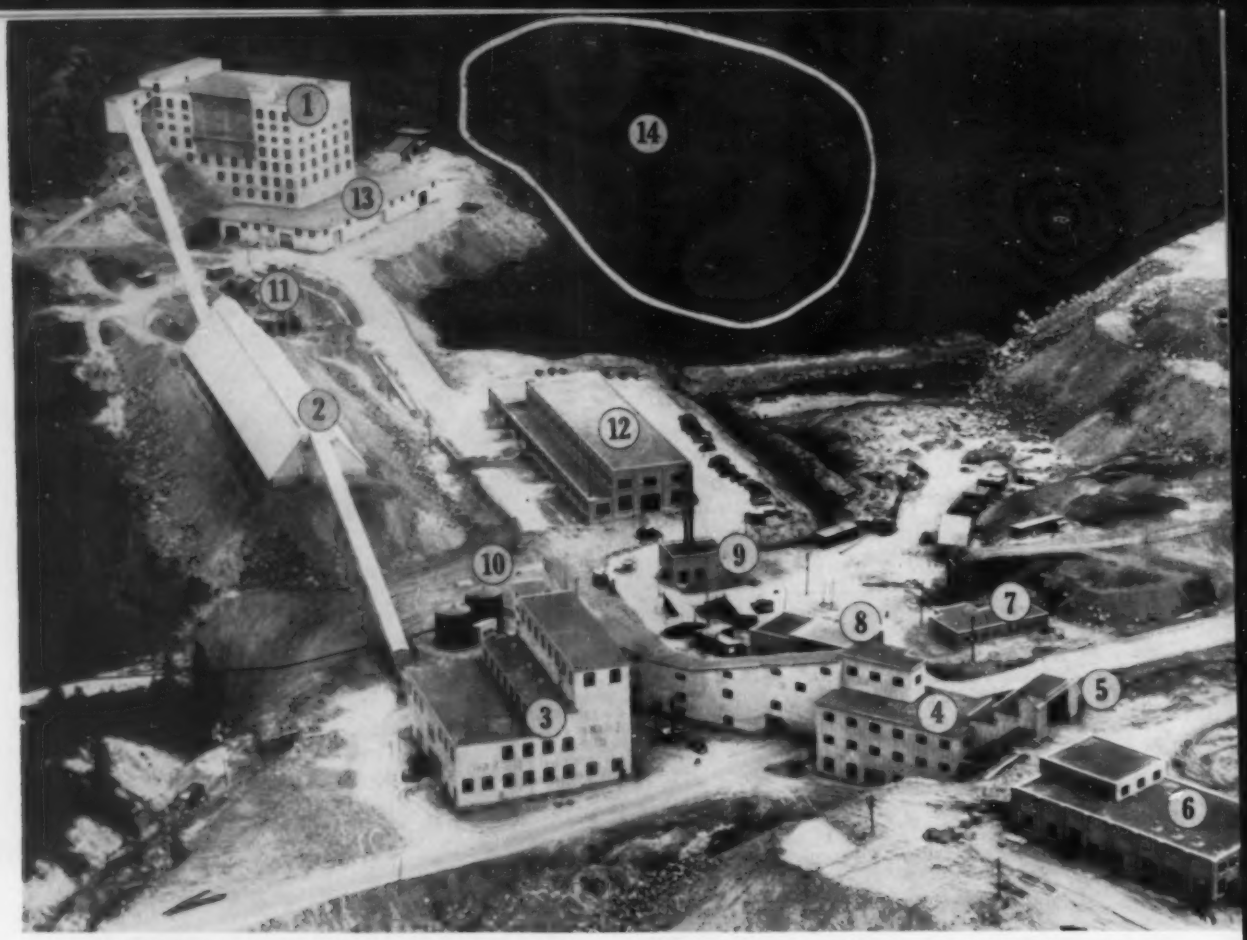
A concentration ratio of 200:1 is made in the main mill circuits. The regrind circuit so multiplies this that the total gravity-concentration ratio is about 1,000:1.

The comparative values of various grades of concentrate illustrate the advantage of upgrading the mill product. A 5 percent concentrate will bring $1.65 per pound of contained WO_3. A 30 percent product $1.835 per pound. But if the same ore is cleaned so that it runs 55 percent WO_3, the WO_3 content brings $2.85 a pound. In the Lakewood plant, therefore, with a negligible loss, and at a relatively small cost, the net value of the ore is increased by about 75 percent.

It takes 24 tons of water for each ton of ore. The mill, which is all-electric powered consumes power costing $0.04 per ton of ore. The low-grade iron concentrate, previously sent to the tailing pile, is now saved and made into near-specification grade.

Test runs on earlier jig tailings have resulted in dollar savings comparable to those on newly mined ore, which demonstrates the efficiency of the Weldon method of jig operation.

Both ore and concentrate values are carefully controlled. Five to 20 mine "assays" are taken each day, and several concentrate samples are also checked. Mine samples, using a standard volume, are "run" in a gold pan, and require about two minutes. Concentrate samples are "run" by weighing standard volumes, and are usually accurate to 0.005 percent.



BLACK LAKE MILL, JOHNSON COMPANY, LTD. 1. Black Lake mill building; 2. 30,000 ton dry rock storage bin; 3. Dryer building; 4. Crusher building; 5. Sluice for primary crusher (where trucks dump); 6. Garage for storage and maintenance of trucks, tractors and other rolling mining equipment; 7. Completely equipped washrooms, kitchen and lunch rooms; 8. Oil fired boilers for central heating; 9. Machine shop, carpenter shop, electrical shop, pipe fitters shop and headquarters for yard maintenance crew; 10. Stores, offices and engineering department; 11. Finished product or bag storage; 12. Tailings disposal area; 13. Oil tanks for dryers; 14. Electrical substation.

New Asbestos Milling Methods Pioneered by Johnson Company

Over 70 years of experience by three generations of asbestos producers was combined in the mill design of the Johnson's Company Ltd's Black Lake mill. Completed in 1953, the mill is one of the most modern asbestos mills in operation today. There are four main features incorporated in the mill:

Johnson's Co. is pioneering the use of ball mills in asbestos milling. Research has proved to Johnson's engineers that ball mills give a more complete fiberizing and at the same time minimize damage to the asbestos fibers.

Full gravity rock flow eliminates the use of bucket elevators and belt conveyors. From the time the ore leaves the surge bins at the top of the mill, it flows by gravity through the various processing stages. The only conveyors used on the main rock flow are those for tailings and the shorts circuit.

Unit-drive equipment is another of the major features for the Black Lake mill. Each piece of equipment has its own drive unit. This provides the flexibility needed by asbestos mills to rearrange the flow to and location of various pieces of equipment used to recover the fibers.

It is the only mill designed with four completely separate circuits. This, too, permits the maximum amount of flexibility for production. And for experimental purposes, any one of the four circuits can be used as a pilot mill at any time without affecting the output or product of the other three circuits.

Old Company—New Mines

The Black Lake asbestos property of the Johnson's Company Ltd. is located in the Black Lake district, near Black Lake, in the Province of Quebec, Canada. The town of Black Lake is approximately 50 miles south of Quebec City and 120 miles northeast of Montreal.

The Johnson's Company's Black Lake development, including open-pit mine, mill, crushing plant, storage bin, and attendant services such as garages, machine shops, etc. represented an $8,000,000 investment.

Headquarters for the Johnson's Company is in the town of Thetford Mines which is four miles northeast of Black Lake. At Thetford Mines, Johnson's Company also operates a 3,000-ton-per-day mill, processing ore from its block-caving mine.

Johnson's Company was incorporated in 1885 but mining had been carried on for 10 years prior to this by individuals who later formed the company. It is still owned and operated by the descendants of the original stockholders.

A. S. Johnson is president and W. J. Johnson is managing director.

Open-pit mining at the Black Lake property began in the early 1900's at No. 1 pit. The original Black Lake mill was constructed to handle ore from this pit.

In 1946 an ore body, discovered by diamond drilling, was opened up for bulk testing. The results proved satisfactory and a decision was made to proceed with the project.

The ore body is shaped similiar to the letter "J" and is approximately 4,000 feet long (around the "J") with an average width of 700 feet and an average depth of 300 feet. It strikes northeast with the southwest end of the ore body forming the bottom of the "J." It lies within and close to the northwest contact of the main Thetford Mines-Black Lake peridotite mass where the latter is more highly fractured and serpentinized. The asbestos mineral occurs mostly as the cross-fiber type.

Benches in the pits vary from 40 to 50 feet in height. Holes are drilled at an angle of 70°, are spaced 12 feet apart, and have a burden of 14 feet. Usually three to four rows of holes are used.

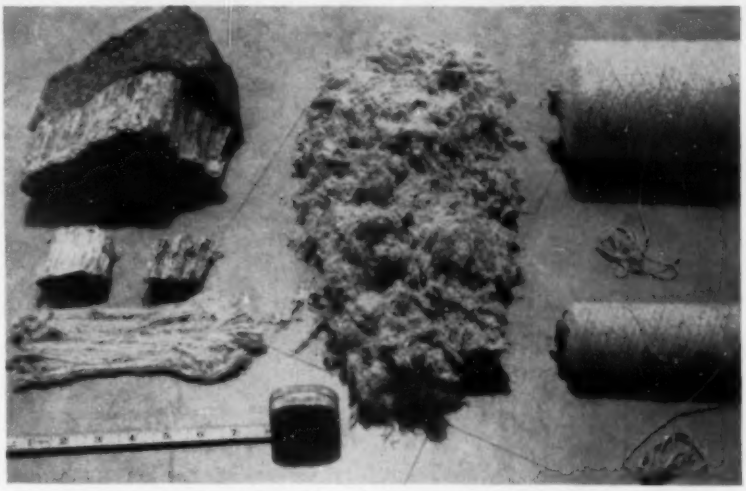
Holes Drilled Below Grade

All holes are drilled from three to six feet below grade (depending on the height of the bench), eliminating the need for toe holes and scaling. This, in turn, permits drillers to work behind the rock pile while the shovel is loading the rock without the danger of drilling into missed holes.

The Johnson's Company uses two Joy TM 500 blast hole drills (4-inch holes), one Joy wagon drill, and one Gardner Denver wagon drill (2½-inch holes).

Holes are loaded with 50 percent Forcite stick powder (3 by 16-inch for the 4-inch holes and 1¾-inch for the 2½-inch holes). Multiple row blasting is accomplished electrically with millisecond caps. Primary blasting ratio is 5¾ tons of broken rock to one pound of powder.

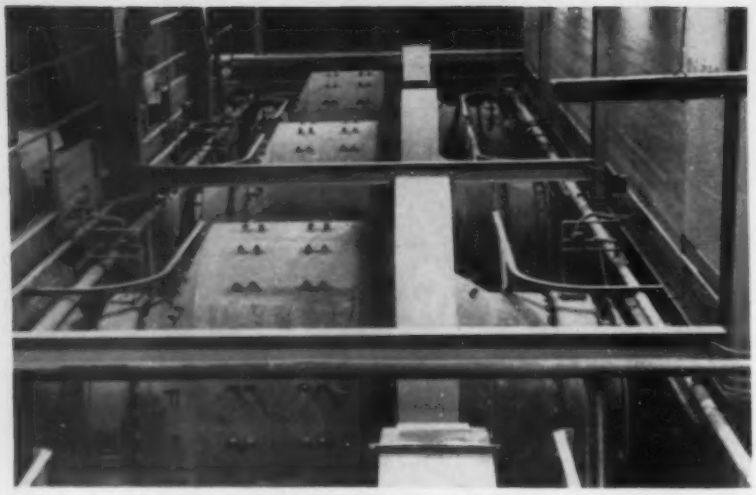
Two twin-drill rigs, wagon mounted, are used in the pits for specialized horizontal drilling applications. Built by Canadian Ingersoll-Rand to Johnson's Company specifi-



ORE, FIBER AND FINISHED PRODUCT are depicted in this picture. On the left are shown asbestos fibers more than 7-inches long (just below the pieces of ore). In the center is a sample of Group 3 fibers used to spin the asbestos cord at right.

YEARS OF TRAINING are required before a man can become a top grader of asbestos fibers says M. C. Pharo, superintendent of mills, at left. Geologist W. N. Asbury describes the ore body as inconsistent with rich plums of asbestos occurring (right).

AIR SWEPT BALL MILLS produce a more complete fiberizing with less fiber damage according to Eric L. Pharo (left), Black Lake mill superintendent. R. N. Moore, superintendent of the Thetford Mines mill, exhibits Group 3 fibers at the right.



GRINDING RESEARCH proved that ball mills did a better job than conventional hammer mills. Johnson Company Ltd.'s Black Lake mill was the first to use this method. The above units are Hardinge, 10-foot by 66-inch, air-swept ball mills.

cations, the "pit-jumbo" is self-propelled by air motors. The two drills, I-R 505, 4-inch drifters, are elevated to drilling position hydraulically. Holes up to 60 feet in depth can be drilled using 8-foot lengths of coupled drill steel.

Four sizes of shovels are used in the pits. There is one 6-cubic-yard Marion (with a 5-cubic-yard bucket), one 4-yard Marion, one 2½-yard Lima, and two 1½-yard shovels. All are electrically operated except the two smaller shovels, which are Diesel operated. A D-8 Caterpillar bulldozer and a Tournadozer with rubber tires are used for shovel clean-up, roads, dumps, etc.

More than 6,000 tons of material are handled by two shifts per day, with 4,000 tons going to the primary crusher. A fleet of eight Mack trucks (six for production and two for spares) is used for haulage. These trucks have a capacity of 22½-tons and are powered by 275-horsepower, super-charged Cummins' Diesel engines.

Asbestos vs. Metal Mills

Asbestos mills differ in many ways from base metal mills. One major difference is that the product must be produced in numerous grades. Table No. 1 lists by grades the seven groups and 32 sub-divisions of the Quebec Asbestos Producers Association.

Continuous sampling and testing is carried out on all the grades of fibers. Screen analyses are made with the Quebec Standard Testing machine. The machine consists of a nest of four boxes of ½, ¼, 10-mesh, and a pan. All grades are made up of one, or two, or all of these mesh sizes in predetermined proportions.

The mill must be able to produce any of the grades required by the various manufacturers of asbestos products. And it must remain flexible enough to keep up with the demand for newer and better products, the use for which continuous research develops.

In order to permit the necessary flexibility for movement of the equipment, the floors of the mill are made of pieces of laminated 2-by-6-inch softwood with a hardwood covering.—as opposed to concrete in ordinary mills. (Hardwood is used because it doesn't splinter easily. Wood splinters are objectionable because of the damage they cause to manufacturing equipment and their tendency to discolor products which are heat-cured.) Holes are drilled in the floor and the machinery bolted in place. Moving is easily and simply accomplished.

The recovery of asbestos is purely a physical separation of the fibers from the rock. No chemical treatment is involved. The rock is crushed to release the fibers which are recovered at the maximum possible length.

Table No. 1

QUEBEC ASBESTOS PRODUCERS' ASSOCIATION STANDARDS

Group	*Sub-Divisions*	*Industrial Uses*
1 & 2 (Crudes)*	0	Fine yarns, tapes, electrolytic cloth, electrical insulation, etc.
3 (Spinning Group)	8	Asbestos suits, gloves, theatre curtains, woven brake linings, etc.
4	9	High-grade shingles, molded linings, wall board, etc.
5	7	Wall board, shingles, high-grade asbestos papers, acoustical tiles, etc.
6	1	Shingles, paper, stucco, etc.
7	7	Car undercoatings, floor tile, industrial putties, etc.

* Crudes are recovered at the Thetford Mines Plant.

Air is Recovery Medium

Suction is used to aspirate or lift the fibers from the screens. A central pneumatic system supplies 360,000 to 480,000 cubic feet per minute of air as required for aspiration at 12-inch water gauge pressure. Approximately 10 tons of air is required to produce one ton of finished asbestos fiber.

Crushing and Drying

The first step in the processing of asbestos ore begins at the primary crusher. Ore from the pit is dumped by the 22½-ton trucks into a 200-ton sluice at the crusher building. At the bottom of the sluice a 60-inch Stevens-Adamson apron feeder transfers the ore to a 4-inch grizzly.

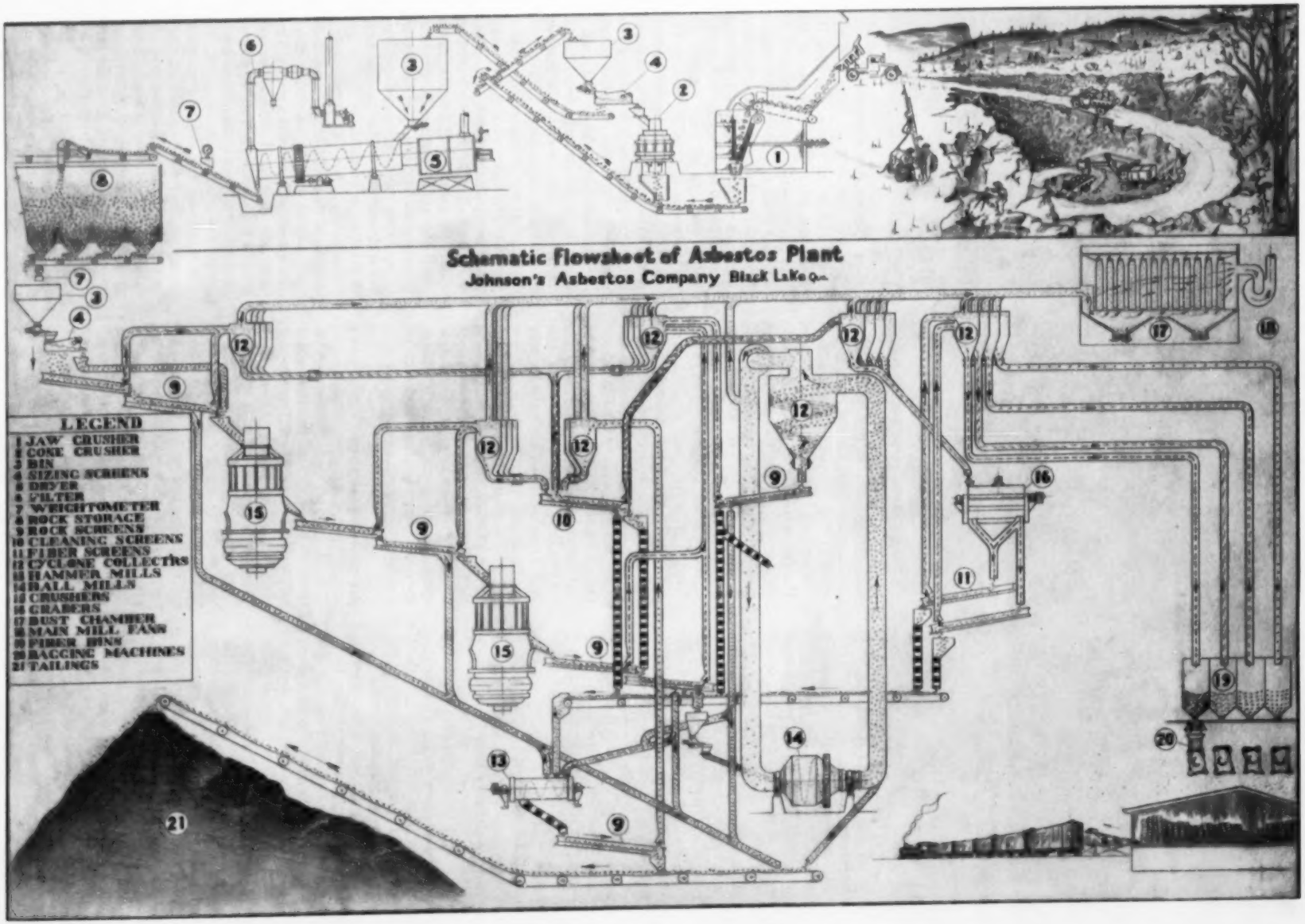
Run-of-pit ore is reduced in two stages to minus-1½-inches. The primary crusher is a 48- by 60-inch Allis-Chalmers jaw crusher. A Nordberg, 5½-foot, standard Symons cone crusher, operated in closed circuit with surge bin and screen, is used for secondary crushing.

After secondary crushing, the ore is conveyed to a Link Belt traveling tripper and discharged into one of four 1,000-ton storage bins. The free moisture content of the ore must be reduced to less than 1.0 percent for effective aspiration of the asbestos fibers. Therefore, the ore is dried by four Hardinge (Ruggles-Coles type) rotary dryers, each 60 feet long and 70 inches in diameter. They are oil-fired and provide enough heat to raise the temperature of the ore to 110° F. at the rate of 100 tons per hour per dryer.

When the ore comes out of the dryer, its free moisture has been reduced to about 1.0 percent. In the dry rock storage bin the latent heat of the ore further reduces the moisture to less than 1.0 percent.

Moist Ore Collects Dust

An interesting method is used to collect the dust from the dryers. At the discharge end of each of the dryers, suction fans pull the hot, dust-laden air from the dryer and carry it to a Dorfan Impingo collector. Each of the four collectors consists of two louvered sections filled with moist ore (ore that has not been through the


Schematic Flowsheet of Asbestos Plant
Johnson's Asbestos Company Black Lake Que.
LEGEND
1 JAW CRUSHER
2 CONE CRUSHER
3 BIN
4 SIZING SCREENS
5 DRYER
6 FILTER
7 WEIGHTOMETER
8 ROCK STORAGE
9 ROCK SCREENS
10 CLEANING SCREENS
11 FIBER SCREENS
12 CYCLONE COLLECTRS
13 HAMMER MILLS
14 BALL MILLS
15 CRUSHERS
16 GRADERS
17 DUST CHAMBER
18 MAIN MILL FANS
19 FIBER BINS
20 BAGGING MACHINES
21 TAILINGS

TWIN-DRILL RIG, built to specifications, is self powered and elevates machines hydraulically. J. M. Cunningham, superintendent of mines, stands between jumbo operators.

OVER 6,000 TONS of ore and waste are handled in two shifts per day at the open pit mine. This picture shows a 22½-ton truck receiving a load from the electric shovel.

dryers). The air is pulled through the openings in the louvers, and into the moist ore where the dust particles are collected. The air then goes through the fan and is discharged to atmosphere.

Moist ore used in the collectors is pulled from two of the four 1,000-ton storage bins through discharges separate from those supplying ore to the dryers.

The ore used in the collectors is dried by the hot air and, together with the relatively small amount of dust, joins the discharge from the rotary dryers. It is then conveyed to the 30,000-ton, dry-rock storage bin. Under this storage bin 28-inch Jeffrey magnetic feeders transfer the ore to conveyors, which, in turn, carry it to the top of the mill building and to the surge bin. From the surge bin the ore flows, by gravity, through the various stages of processing.

Milling Asbestos Ore

The mill operation can best be described in three steps. First is the rock flow. The fiber-bearing rock is crushed and screened, in stages, until the particles range in size from ¾-inch (or slightly larger) down, in a sort of gradation, to minus-$\frac{1}{16}$-inch. Next the fibers, aspirated from each of the screening operations in the rock flow, join the fiber flow. And last, the undersize products from the bottom deck of all the double-deck screens are carried by conveyor to the "shorts" circuit where they are further reduced and screened to 28-mesh.

The rock flow starts under the surge bin where the ore is fed by a Hardinge constant weight feeder to a Symons 3- by 8-foot rod deck screen with ¾-inch openings. Oversize from the screen goes to the primary mill crushing stage, comprising two Symons 3-foot short head crushers set at ¾-inch and two Kennedy-Van Saun 38½ fine bowl crushers.

The four separate circuits in the Black Lake mill start immediately below the 200-ton surge bin at the top of the mill building. Let's follow the rock through one of the four circuits.

Undersize from the rod deck screen goes to the "A" screen, which is a double-deck tandem, 5- by 12-foot shaking screen. The top deck has ¾-inch openings and the bottom deck $\frac{1}{16}$-inch openings. Oversize from both decks of the "A" screen joins the oversize from the rod deck screens at the crusher. Undersize goes to the "shorts" circuit.

From the primary mill crusher, the ore goes to the "B" screens. These two screens (two for each of the four circuits) are the same as the "A" screen except for the $\frac{5}{16}$-inch opening in the top screen deck. Undersize from the bottom deck goes to the "shorts" circuit. Oversize from both decks goes to the secondary crusher.

The secondary crusher, same type as the primary crushers, is set at ¾-inch. Discharge from the crusher goes to two "C" screens, with $\frac{1}{16}$-inch openings for both decks. Oversize goes to a surge bin, and undersize to the "shorts" circuit.

Air Swept Ball Mills

A Hardinge volumetric feeder transfers the ore from the bin to the ball mill. These ball mills, one for each of the four circuits, are the first to be used by the asbestos industry. They replace the hammer mills (jumbos) currently used at the Thetford Mines' mill of the Johnson's Co. They are Hardinge 10-foot by 66-inch air-swept conical mills with a 50-ton-per-hour capacity. They are driven by 350-horsepower General Electric motors through Falk gear drives.

Fans, with 200-horsepower motors, supply 60,000 cubic feet of air per minute at 10-inch water gauge for each of the ball mills. The fibers are drawn from the mills as they are released and the rock particles are tailing.

How Fibers Are Processed

Now that we have followed the rock flow from the surge bin at the top of the mill to the tailing pile, let's go back up to the "A" screens on the sixth floor and check the fiber flow. There are two lifts from each of the 20 screens in the "A" to "C" groups and one lift from each of the eight screens in the "D" group. The aspirators, located at the bottom end of each deck, consist of a sheet-metal hood extending the full width of the screen. The opening over the screen is rectangular in shape and has a depth of approximately four inches. The hoods can be raised or lowered to control the degree of lift.

The shaking action of the screen causes stratification of the fibers and the rock particles, with the fibers rising to and riding on the top. This materially assists in lifting the fibers from the rock particles. After the fibers are aspirated, they are collected in cyclones and discharged through motor-driven air locks to the next step in the operation.

Essentially, the fiber processing consists of three cleaning stages, with a separation of the long and short fibers made at each of the stages. The fibers are then graded and blended according to length until the proper proportions, by weight, have been achieved.

It would be too involved to trace the entire fiber flow cycle, but, perhaps, following one middling product through the flow sheet would help clarify the operation. For example, let's trace the fiber flow from the first lift at the top deck of the "A-4" screen.

An initial classification of the fibers is made by the two screen decks of the shaking screens. The fibers from

ASBESTOS FIBERS are loaded in 100-pound bags by hydraulic cylinders. Each bag is marked to designate the fiber-grade.

FIRST ASPIRATION or lift of the asbestos fibers is taken from the "A" screens. These units are double deck, 5- by 12-foot, tandem shaking screens. Suction hoods remove the upper fiber layer from the stratified bed of ore on each deck.

the top deck of the "A-4" screen will be primarily long fibers—plus-¼-inch. These fibers, after aspiration, are joined by the fibers from the top deck of the "A-3" screen and are collected in a cyclone. From the cyclone the fibers go to the "F-3" screen, one of six primary cleaning screens. (Note: The four separate circuits end when the fibers reach the primary cleaning screens.)

At the "F-3" screen the fibers are separated into long and short products. The shorter fibers are returned to the "C" screens in the rock flow circuit, and the longer fibers go to graders. The graders are cylindrical trommels with a fixed perforated plate and a rotating horizontal shaft. Positive flow is provided by feeder arms attached to the shaft.

The graders in the Group 3 circuit separate the fibers into a long and short product. The longer component, after further conditioning and screening, is subjected to a further grading and then goes to the bagging port. The shorter product from the Group 3 circuit is treated in a system of graders to produce a Group 4 fiber. The undersize from this operation joins the shorter product from the cleaning screens at the Group 5 graders. Here again a long and short product results with the plus component a Group 5 fiber and the minus size to the Group 6 graders. From the Group 6 graders there is a Group 6 finished product and the undersize goes to Group 7 where it is joined by the fibers from the shorts circuit.

"Shorts" Circuit Operation

The third step in the mill description is the "shorts" circuit. Manufacturers of asbestos products are finding more and more uses for the shorter fibers. And the asbestos industry is continually searching for new and better methods to recover these fibers. The "shorts" circuit of the Black Lake mill recovers fibers in the minus-16-mesh, and plus-28-mesh range.

As mentioned earlier, the undersize products from the bottom deck of all the screens are carried by conveyor belt to the "shorts" circuit. Three jumbos (hammer mills) constitute the initial phase of processing. The jumbos release the fibers still held by the rock particles. Products from the jumbos go to 28-mesh Hall-type shaking screens which have an eccentric motion. The rock particles, both oversize and undersize, are transferred to tailing.

The short fibers which have been aspirated from the Hall screen following the jumbos are then classified in a Hardinge air classifier where heavy objectional rock particles and "crudy" veinlets are rejected. The discharge is further treated to separate "crudy" fiber from the rock particles and the fiber recovered. The whole Group 7 material (including the undersize from the Group 6 graders) is then fiberized to give bulk in the fibers, followed by a series of screening operations, and then to the Group 7 bagging port.

The dust collecting system is located between the four main mill fans and the central suction chamber. In the earlier operations a large number of small fans were employed, with one fan used for two cyclone product collectors. In the new mill all the cyclone collectors are connected to the central suction chamber. The main mill fans draw the air through the housing of the filter from the suction chamber.

The 10-compartment American Wheelabrator "Dustube" unit consists of 7,200 cotton sateen bags with a combined cloth area of 88,560 square feet. Each bag is 5 inches in diameter and 126 inches long. Shakings or rejects from the system are graded and bagged. This product is called "floats."

The dust collecting system is a continuously automatic unit rated at 352,000 cubic feet per minute at a 4:1 ratio. The rated figure has, on occasion, been considerably exceeded.

Packing and Shipping

Below the fiber bins (bagging ports) for each of the various grades, manually operated pneumatic cylinders load the fibers into 100-pound bags. Each bag is marked to designate the fiber grade, and then stored for shipment.

Johnson's Co. is an independent producer and is not affiliated with manufacturers of asbestos products. The company maintains its own sales force, which works closely with the mill in determining the grade of fibers to be produced.

The United States is the largest consumer of Johnson's asbestos, taking about 60 percent of the production. However, the company ships asbestos to the United Kingdom, Belgium, France, Italy, the Scandinavian countries, Spain, Portugal, Australia, Japan, and South American Countries.

SOLUTION DESTRUCTION of magnetite is illustrated by altered, non-magnetic andesite (bottom). Unaltered andesite in same district (top) attracts magnet.

Part II

New Guides to Hidden Ore Deposits

By SIGURD K. HERNESS

Do magnetic negatives indicate favorable ore-bearing zones? The author and his associates say yes. They base their startling conclusion on the fact that the normal magnetite content of the country rock is destroyed by early pneumatolytic and later solutions genetically related to ore-bearing fluids. This depletion of the magnetite can be applied in the search for base or precious metals as well as uranium occurrences.

This article is the second of two parts describing how magnetics can be used to outline areas of hydrothermal alteration. Last month Mr. Herness reviewed progress in instrumentation, told of the development of continuously recording, total intensity magnetometers, and the past use of geophysics in exploration. He discussed basic geophysical principles in order to lay the groundwork for a more complete understanding of geomagnetics. In the following presentation he describes the interpretation of observed data and points out fundamental factors in planning a survey. Ed.

A valuable new concept—the relationship of magnetic negative anomalies with hydrothermal ore deposits—provides a completely new tool for use in the search for hidden ore bodies. The importance of this established relationship can be readily appreciated when one considers that the past use of magnetics in mining exploration has been confined to regions of magnetic highs or positives. Thus the use of the magnetometer was formerly limited to the delineation of iron ore bodies, Pre-Cambrian gold or copper-pyrrhotite deposits, or magmatic segregation deposits, such as nickel-cobalt-copper mineralizations. The methods developed by Minerals Exploration Research Corporation open new horizons because hydrothermal base or precious metal ore deposits and uranium occurrences can be linked to magnetic negative anomalies.

During the past few years, the writer and his associates have compiled regional and detailed magnetic, structural, and metallogenic maps covering the greater portion of the western United States. The primary purpose was to determine the interrelationships of magnetic anomalies, structure, and ore deposits. A secondary objective was the determination of regional tecto-metallogenic fabric.

Classification

Magnetic anomalies may be classified into four general categories on the basis of geological environment and genesis, as follows:

1. Primary or basement susceptibility anomalies (due to primary

Mr. Herness is president of Minerals Exploration Research, Golden, Colorado.

basement compositional variations).

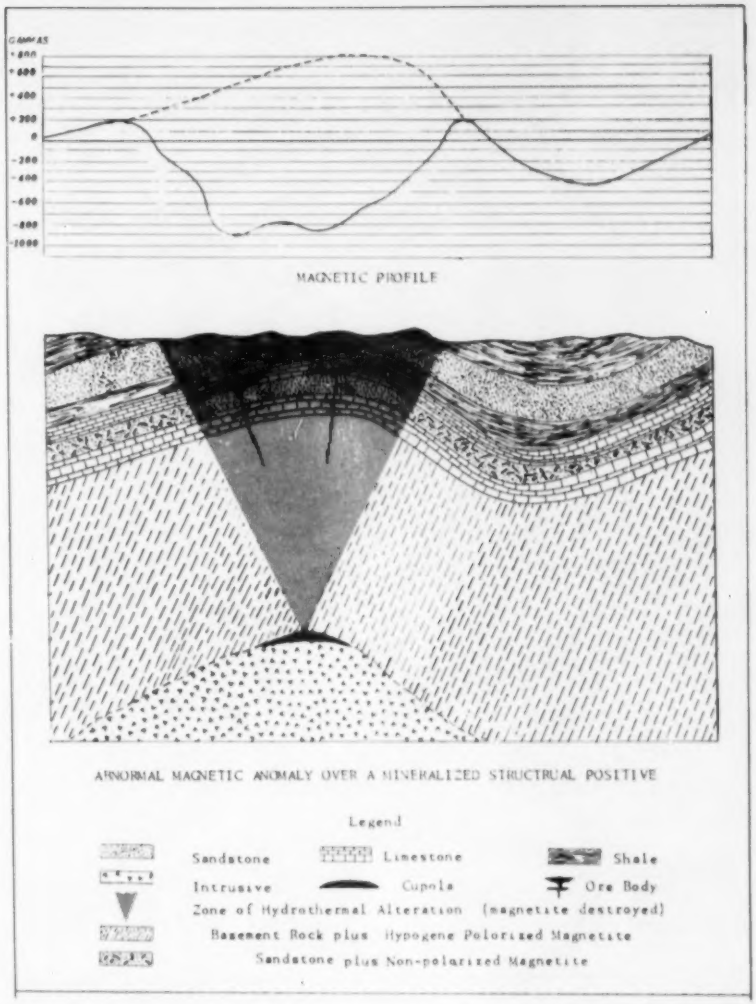
2. Structure anomalies (due to tectonic upwarp or downwarp structure).
3. Secondary or hydrothermal susceptibility variations (due to hydrothermal destruction of magnetite or other changes produced by hydrothermal solutions during ascent).
4. Miscellaneous anomalies (due to pyrometamorphism, etc.).

It is difficult to list the recognition criteria for the above anomaly types. Only by correlated study of all available magnetic and geological data by persons thoroughly experienced in magnetic interpretation can anomalies be evaluated and classified for effective exploration. A few generalizations, however, can be made.

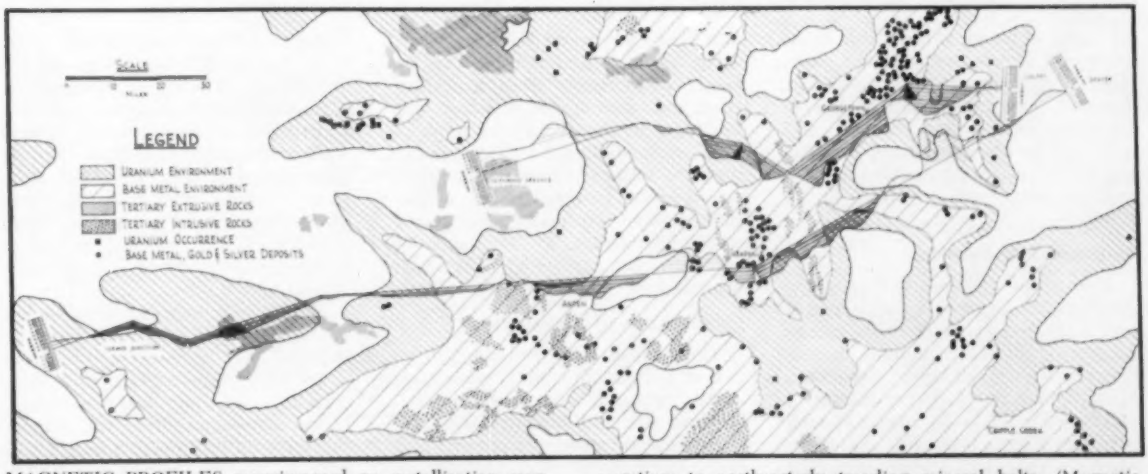
Features of Type One

Primary susceptibility anomalies are often characterized by linear, broad outline which is bowed and presents a ragged appearance. They show continuity over large distances (50 to 100 miles) and exhibit mutual parallelism. Basement fabric anomalies are usually moderate positives (zero to plus 500 gammas—see top figure page 58).

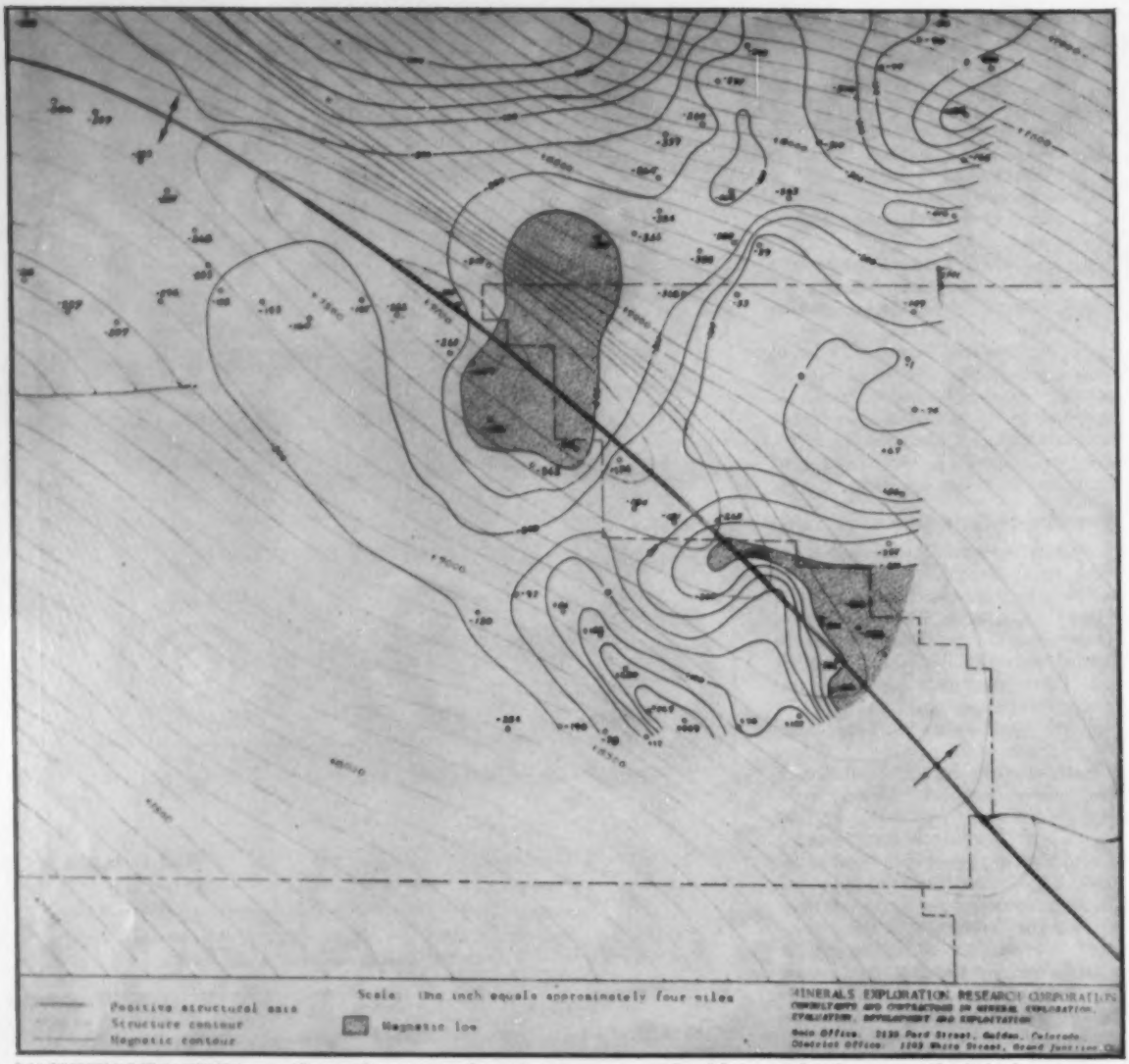
In most areas the pre-Cambrian or other basement and igneous rocks show broad compositional layer fabric. Each layer contains varying amounts of hypogene polarized magnetite. These variations in polarized magnetite content produce variations in magnetic intensity and are recognized as anomalies. Often recognition is facilitated by the fact that casual map inspection reveals a fabric pattern exhibiting discordancy with the known post-basement structure fabric. Correlation of known basement fabric is an aid to recognition of this anom-



NEW GUIDE for exploration is depicted by magnetic negative profile caused by hydrothermal alteration in the above section. Normally the anticline would produce a structural positive (following the broken profile line), but solution destruction of magnetite before and during ore deposition makes just the reverse condition true.



MAGNETIC PROFILES superimposed on metallization map of an area in northwest Colorado, indicates relationship of negatives to northeasterly trending mineral belts. (Magnetic data after Woolward and United States Geological Survey.)



MAGNETIC NEGATIVES coincident with a structural positive (anticline) are shown on this regional map. The shaded areas are magnetic negative anomalies along the anticlinal axis which were outlined by semi-detail surveys. The light lines are contours on the Dakota formation which overlies the uranium producing Morrison.

aly type, although it is of little or no economic significance in many cases. The recognition of these anomalies, however, is a prerequisite to further interpretation of field-observed data gathered for the purpose of identifying and classifying anomalies of mineral or petroleum potential significance.

Structural Anomalies

This group often results from structural positives caused by arch trends and anticlines, or structural negatives resulting from basins, troughs, or synclines. They are "distance" anomalies, in that magnetic variation is due to varying distance to the basement rock (see top figure page 57). In areas where folding has taken place, the basement rocks are likewise upwarped and hence are nearer the surface creating the structural positive. An anomaly discontinuity does not imply structural discontinuity; where the fold axes transect basement rocks of high susceptibility, local magnetic positives result. Where positive fold axes transect basement rocks of low susceptibility, no magnetic anomaly results, inasmuch as non-magnetic rocks can not register any attraction regardless of nearness to the surface.

Hydrothermal Anomalies

These result from solution-destruction of the normal country rock magnetite content and are therefore coincident with hydrothermal base metals, precious metals, and uranium belts. The hydrothermal solutions are magma differentiation derivatives which migrated into closure areas (arch trends and anticlines) in the magma roof. The early pneumatolytic emanations from magmas produce widespread argillic alteration effects with accompanying destruction of magnetite and abstraction of iron. Later solutions, genetically related to the ore-bearing fluids, cause intense, fissure-localized, sericitic, envelope alteration effects while also attacking the magnetite.

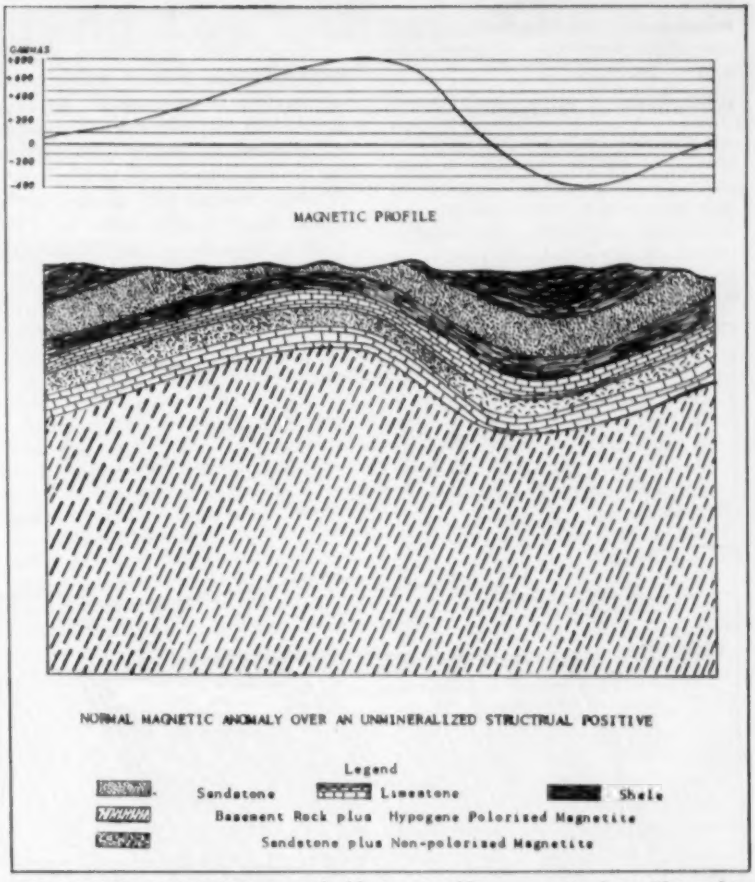
The above relationship between hydrothermal alteration and magnetic negatives was observed on the basis of statistical metallogenic map relationships and petrologic evidence. There is no doubt that the magnetometer is an instrument which is valuable for accurate mapping of hydrothermal alteration, either regionally or

locally, and in detail. Regional correlation with structure and metallization indicates its effectiveness in provincial evaluation of ore potential. Local district surveys over areas where production has been delineated and hydrothermal alteration has been megascopically mapped, prove its district effectiveness in delineating boundaries of hydrothermally altered and potential ore areas. Detail surveys over veins show that pronounced wall rock magnetic negatives are a means of tracing covered veins or localization of ore shoots.

Detailed magnetics, for example, were effectively utilized to delineate covered veins at the Los Ochos mine near Gunnison, Colorado. On the basis of Minerals Exploration Research Corporation's recommendation, eight diamond-drill holes out of ten encountered ore. Even before completion of development, it can now be said that it is one of the major uranium discoveries in North America. Laboratory testing of altered and unaltered rock specimens prove conclusively that a magnetic negative should result over altered areas.

Structure Contours Aid

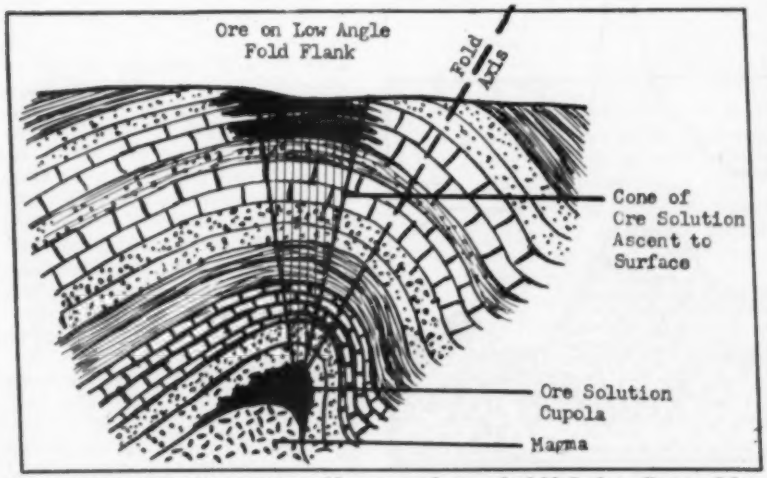
In order to properly identify, delineate, and evaluate hydrothermal mineral belts and areas, however, structural contour maps are often essential. Nearly all known hydrothermal ore deposits (including most of the Colorado Plateau uranium deposits) are concentrated in structural positives such as regional culmination axes, arch trends, and anticlines. Structural positives produce magnetic positives except where hydrothermal alteration has destroyed the magnetite in the country rock. This relationship has been observed throughout the western states in areas of Mesozoic and Tertiary orogen and mineralization. (The pre-Cambrian mineralized areas, however, usually produced magnetic positives). From the foregoing generalizations, it is apparent that Mesozoic and Tertiary ore potential expectancy may be anticipated in structural positives where magnetic negatives occur.



STRUCTURE CONTOURS are valuable in assembling magnetic data. The arching of the sediments and basement surface results in a magnetic high. A similar synclinal structure may cause a magnetic negative unrelated to hydrothermal activity.

Magnetic data prove a nearly perfect coincidence of metallogenic trends and magnetic negatives. In the western states nearly all major metallization and uranium occurrences are on northeast trending structural culmination axes (which are usually subtle flexure axes, normal to the apparent geological fabric and usually not apparent). The large ore localizations are present where these culmination flexure axes are transected by the apparent northwest trending structural positives.

Uranium occurrences are on the peripheral flanks and especially on the basin-ward extension projections of intrusive, base and precious metal trends. Pronounced magnetic negative anomalies (–600 to –2,000 gammas) are present on structural positives where extensive base and precious metal deposits are present. Mild magnetic negatives are coincident with uranium and quicksilver producing



WHY NEGATIVE ANOMALY would occur on low angle fold flank is illustrated by this hypothetical diagram showing the genetic relationship of structural asymmetry and localization of ore deposition.

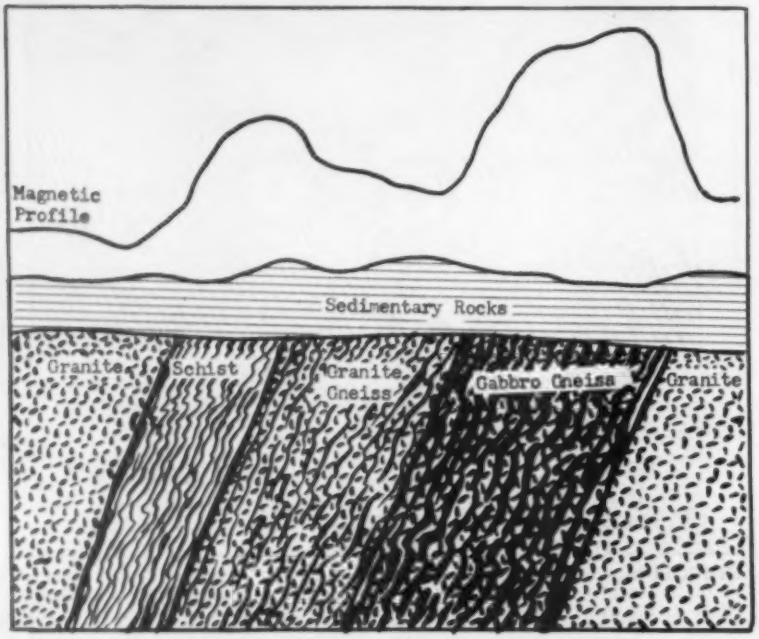
structural positives, such as the Placerville-Gateway uranium trend, which is coincident with the Uncompahgre arch.

Miscellaneous Anomalies

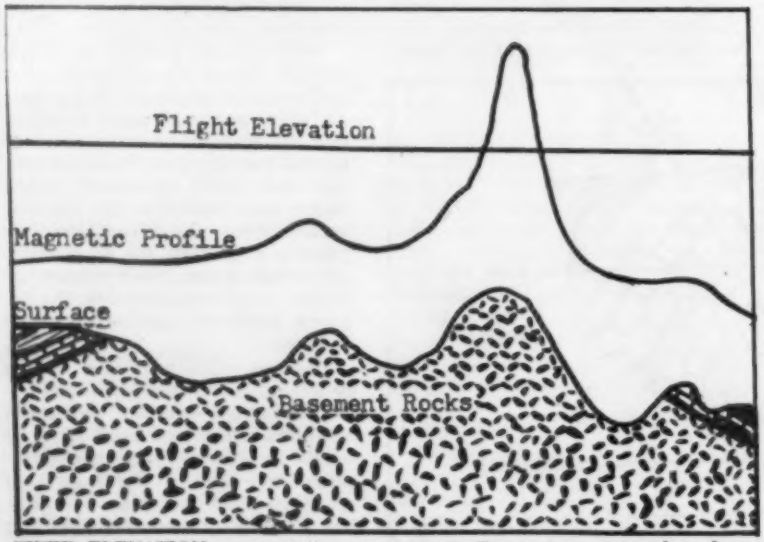
These may be due to pyrometamorphic (heat effects) formation of magnetite in the peripheral areas of intrusives, contact metamorphism, hydrothermal pyrrhotite mineralization typical of pre-Cambrian mineralization, magmatic segregation deposits, etc.

Planning of Magnetic Surveys

The planning of magnetic surveys must take into account geologic and topographic environment. Regional delineation of structural and metallogenic fabric is usually accomplished by ground determinations taken on a four- to ten-mile grid density, or by aeromagnetic profiles flown on a six- to 15-mile profile spacing. District and subdistrict investigation for the purpose of determining potential ore boundaries or anticlinal structures are best executed by making ground determinations on a ¼- to two-mile grid spacing, or ⅛- to one-mile airborne profile spacing.



MAGNETIC VARIATIONS due to susceptibility changes in primary basement composition are characterized by a relatively broad outline. The profile shows magnetic positive anomalies over the gabbro gneiss and the schist.



FIXED ELEVATION aeromagnetic surveys are ineffective in regions where basement or igneous rocks outcrop. In this theoretical instance the terrain anomaly is of greater magnitude than true geological conditions indicate.

Selection of Conveyances

Manually carried, non-recording instruments, as well as vehicle-borne, helicopter, or fixed-wing airborne recording magnetometers, can each claim advantages depending on the geologic and physiograph environment.

Fixed-wing aeromagnetic methods are superior in that large scale surveys may be completed in a shorter period of time; data contouring and interpretation is facilitated by the fact that continuous values are available along each profile, and costs are often less. However, many environments do not permit use of fixed-wing aeromagnetic surveys, because terrain anomalies, which often are of greater magnitude than the geological anomalies, may be introduced. Fixed-wing methods are best suited to provincial, regional, and district surveys where all data may be recorded at a fixed elevation above sea level, such as areas of low relief or regions where sedimentary rocks outcrop. Since unmetamorphosed sedimentary rocks contain very little polarized magnetite, their effective susceptibility approaches zero and terrain irregularities may be considered as "free air effect" and ignored. The anomalies in such cases will reflect the composition and structure of the underlying basement rock surface.

In areas of rugged relief, where highly susceptible basement or igneous rocks outcrop, fixed altitude surveys are ineffective. The magnetic surface is the topographic surface and anomalies will reflect irregularities of terrain.

Manually transported, vehicle-borne or helicopter-borne instruments must be used where land surfaces are very irregular and basement or igneous rocks outcrop. Choice of conveyance must then take into account the purpose, data density requirements, accessibility, and size of area. If the region is small, staging costs will often prohibit helicopter conveyance unless many such surveys are involved. Road accessibility determines whether vehicle-borne recording instruments may be utilized. Ground methods are best suited to regional, preliminary, low-density surveys and small detailed investigations.

The writer wishes to give due credit to his able associates, Charles E. Melbye and Stuart S. Merwin, for their enthusiastic interest and industrious application of effort which contributed to the success of the research which forms the basis of this article.

How New Mining Law Affects Claims

Congressional action to amend the mining laws and to provide for multiple use of the surface of the same tracts of public lands neared completion as this issue went to press. The Senate on June 28 passed the bill by voice vote and the measure was in Senate-House conference committee to iron out the differences in the Senate and House versions.

The House on June 20 passed H. R. 5891 by Representative Rogers of Texas, following Interior Committee approval on May 24. Amendments proposed by the Department of Interior and supported by the Department of Agriculture were adopted. These specify that (1) the measure would also apply to the revested Oregon and California Railroad Grant Lands and reconveyed Coos Bay Wagon Road Grant Lands, with revenues from these lands to be disposed of in accordance with present law; (2) the head of a federal department or agency, including but not limited to the executive departments, may initiate *in rem* action to resolve title uncertainties to previously located mining claims; and (3) the legislation would not "limit or repeal any existing authority to include any limitation or restriction" in patents hereafter granted.

The Senate Interior Committee, in considering similar legislation (S. 1713) by Senator Clinton Anderson of New Mexico and four others, adopted the House amendments to H. R. 5891. It further amended the bill to include provisions "the need for which developed from the hearings." All amendments were for the purpose of perfecting or clarifying the intent of the bill; none changed the substance or philosophy of the measure.

The principal amendment, proposed by Senator Millikin of Colorado, provides that a locator of a claim on which the timber has been disposed of under this act must be supplied with other timber, of like kind and quantity, that he needs to develop the mineral resources of his claim, up to the amount of timber of the same type disposed of by the federal agency.

A second amendment makes certain that surface rights to waters reserved to the United States, as well as those assured to mining claimants, will continue to be regulated and controlled by the provisions of state law as at present. The third change in wording was to make it clear that the new law shall leave unaffected the rights of reservation to the United States and the multiple mineral development under the mining laws and the leasing act established by Public Law 250 and Public Law 585 of the 83d Congress.

The Senate Interior Committee on June 15 presented a lengthy report on the bill, outlining the purposes, and recommended its passage. A minority report in opposition to the legislation was submitted by Senator George Malone of Nevada.

Senator Malone maintained that both the public and the prospector are fully protected under present law, and that the amended act opens the door for continual interference by government officials, granting them the power to determine the validity of a mining location within their own department. The power in the hands of bureau officials, he said, would destroy the prospector and reverse the Supreme Court decisions for more than 80 years.

In the debate on his bill, Senator Anderson stated:

"I emphasize that the holder of any valid claim in existence at the time of enactment of this legislation could retain all present rights to any and all surface resources on the claim. On a claim located after enactment, the locator would have full right to all surface resources of the claim which may be needed for carrying on mining activities. His rights to subsurface resources remain unchanged on claims located both before and after enactment. Upon proceeding to patent, he would have full title, as heretofore, to both surface and sub-surface.

"The mining law of 1872, based as it is on private initiative and free enterprise, should and must be preserved. Senate Bill 1713 does not in any way disturb the basic principles of that law. S. 1713 specifically makes mining activity the dominant use—the paramount use—on lands on which valid mining claims have been located.

"Subsection 4 (c) recognizes that a mining claimant has the first right, the first call on any and all surface resources of his claim which he needs for carrying on activities related to mining. This affirmative right to use surface resources extends to timber he needs in his mine or processing operations, to sand and gravel to build his road, to grass for his mules, and the like.

"It might be well to state again that S. 1713 does not in any way interfere with, or have any bearing upon, the full and complete ownership —ownership in fee simple absolute, as the lawyers say—of a mining claimant who proceeds to patent his claim."

What New Law Does To Mining Claims

• • • Bans the location of mining claims for common varieties of sand, stone, gravel, pumice, pumicite, and cinders and make them subject to disposal under terms of the Materials Disposal Act. It would not affect the validity of any mining location based upon discovery of some other mineral occurring in or in association with such a deposit (for example, gold occurring in gravel). Block pumice which occurs in nature in pieces having one dimension of two inches or more would continue to be locatable under the mining laws.

• • • Prohibits the use of mining claims, hereafter located and prior to patent, for any purpose other than prospecting, mining, processing, and related activities.

• • • On claims hereafter located, authorizes the federal government to manage and dispose of timber and forage, and bars the mining claimant from removing or using the timber or other surface resources except as needed for mining activities. (These limitations do not apply after patent, and the patentee would acquire full title to the mining claim and its surface resources as at present.)

• • • Provides an *in rem* procedure under which the federal government can resolve title uncertainties resulting from the existence of abandoned, invalid, dormant or unidentifiable mining claims located prior to the enactment of this measure.

NOTE: THIS LAW DOES NOT APPLY TO EXISTING CLAIMS.

Prospects and Possibilities for

TEXAS URANIUM

By GEORGE T. PRIGMORE

Texas—long the king bee in petroleum production—is seldom included in a list of states noted for uranium production. The Colorado Plateau states which comprise the Four Corners Area (Colorado, Utah, New Mexico, and Arizona), naturally, receive top billing in such a listing, with all others assuming secondary rank. Presently, the state of Texas falls in this latter category.

Don't Overlook Texas

However, Texas should not be overlooked as a uranium province. Whereas exploration and development of uranium properties in the Colorado Plateau have been progressing along boom proportions, the reverse is generally true in the state of Texas, although minor flourishes of activity have taken place from time to time. Two rather obvious reasons account for this. First, the most favorable place to look for anything, whether it is uranium or oil or any other mineral, is near where it has been previously located. Uranium minerals have been known on the Plateau since before the turn of the century. Thus, when it became a strategic mineral for atomic energy, the Plateau was the first place to look.

The second reason Texas uranium exploration has proceeded more slowly can be traced to the land situation. The average prospector wants to search for uranium on lands which he can easily acquire, preferably public domain. There are vast acreages of these federally owned lands on the Colorado Plateau, which created an almost ideal situation due to the proximity of already known deposits of ore. In Texas, however, there is relatively little public land, except for a few National Parks and National Forests. The reason for this, of course, is that Texas retained title to all of her public lands when she entered the Union, and any land in Texas now owned by the federal government has been acquired by purchase or by gift. Since most Texas land is privately owned, it must either be prospected by the land owner himself, or leased by the prospector for a sum of money. In the first instance, the land owner feels no urgency for finding any uranium deposits which may be located on his land, since they are still his any time they are found. Secondly, most prospectors shy away from leasing private lands for prospecting, since it often involves large outlay of cash and more "red tape" than he is willing to expend when he can prospect on public domain in the Plateau area.

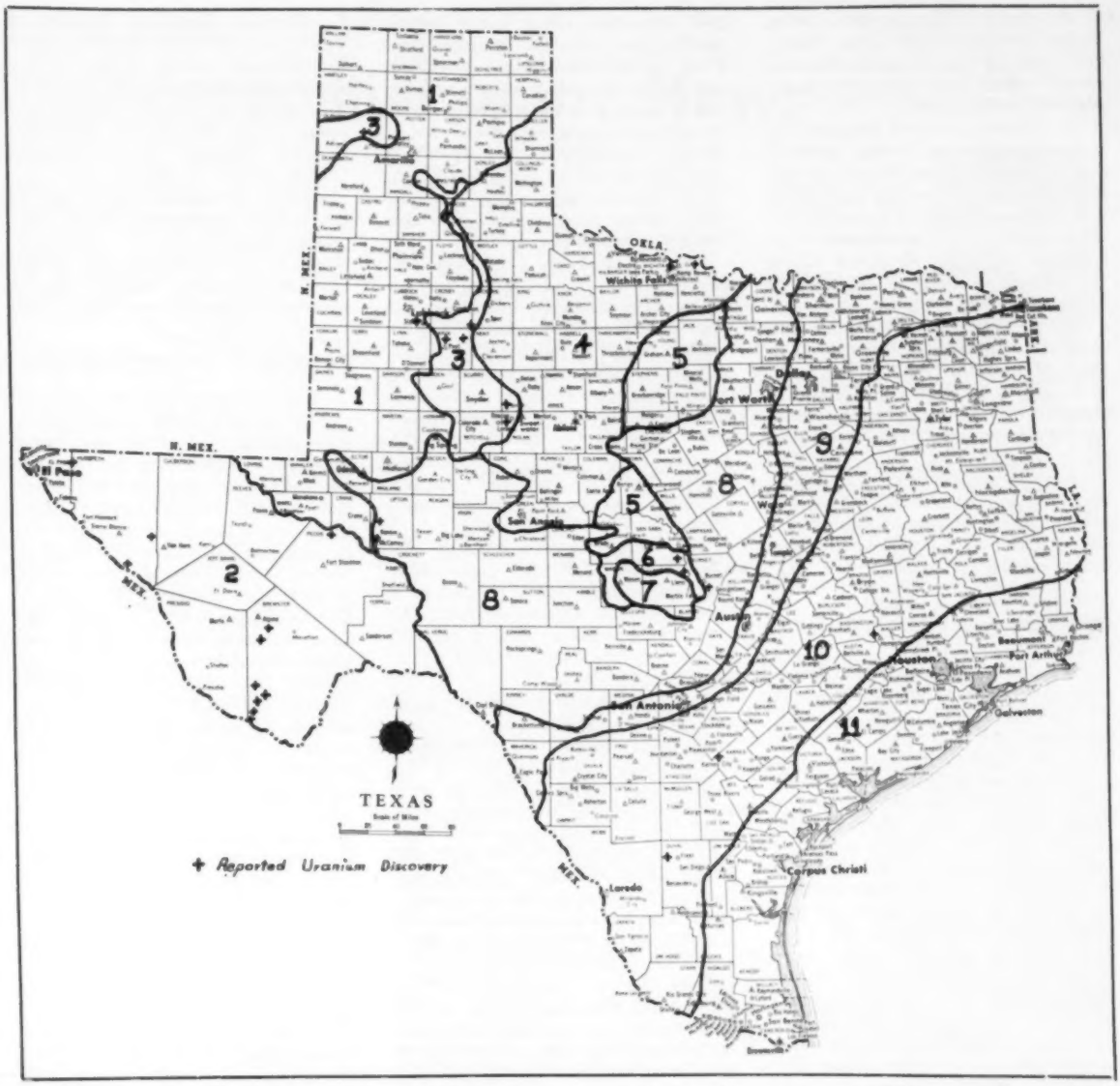
Eleven Prospecting Areas

Texas, producing no uranium ores at present, has shown a number of occurrences of radioactive minerals. As a separate prospecting province, Texas can be divided into eleven generalized geological areas, which are discussed briefly in the following paragraphs. The prospecting potential of each area is also included. It should be pointed out that this discussion is based primarily on the information that has been learned about uranium mineralization and occurrence in other areas, chiefly the Colorado Plateau. It should also be noted that this information is inadequate and incomplete, as the control of uranium mineralization and the original source of the uranium are questionable.

Area 1, the High Plains, is made up primarily of late Cenozoic rocks on the surface, mostly loosely consolidated sands, gravels, and clays of the Pliocene Ogalalla formation and overlying Quarternary lake, fluviatile, and eolian deposits. A thin tuff bed, 12 to 18 inches in thickness, within the Ogalalla, indicates that the region offers good possibilities for uranium prospecting. Although this bed is not thought to be important as the ore itself, it is significant as the source material. The coarse sandstones and gravels which make up the major part of the Ogalalla would be good hosts for uranium which had been leached out of the tuffaceous beds by ground water. The tuff itself, which is exposed along the walls of erosion canyons, does show increased radiation, as have associated beds in localized areas. In southeastern Lubbock County, such ores have been assayed and indicate commercial concentrations; however, most samples have shown less than 0.1 percent uranium oxide.

The Trans-Pecos Region, *Area 2*, is made up of a series of folded and faulted mountain ranges separated by bolsons, which are composed of unconsolidated or loosely consolidated fluviatile deposits. The mountainous areas contain outcrops of many ages

Mr. Prigmore is a consulting geologist and member of the geologic firm of Uranium Exploration Service which has offices in Lubbock, Texas and Grand Junction, Colorado.



of rocks and have long been known for commercial mineral deposits, chiefly lead, zinc, copper, silver, mercury, and fluorspar. Much of the region, particularly along the Rio Grande River, is inaccessible and little known, which, together with the fact that the area is so diversified geologically, makes it difficult to discuss the area in brief, generalized terms. However, some of the more important prospecting areas will be pointed out.

Tuff-Sandstone Contact

Generally, four geological conditions in the Trans-Pecos area are considered favorable for the localization of uranium minerals: (A) areas where volcanic tuffs are in contact with sandstones, (B) coal-bearing formations, (C) hot spring areas, and (D) old mining districts.

(A) In the Colorado Plateau area there are indications that uranium has leached out of volcanic tuffs and been deposited in the associated sandstones, a situation similarly noted in Lubbock County, Texas. This same sequence exists in the Davis Mountains area, where tuffs are common, particularly on the north and east sides of the mountain mass. Here they are in conjunction with Cretaceous sandstones which would make excellent host rocks. Such areas of uranium mineralization have been noted in Hudspeth and El Paso Counties.

The Terlingua quicksilver district in the Big Bend country offers excellent opportunities for uranium occurrence. Across the Rio Grande River in Mexico, uranium minerals accompany the mercury and fluorspar deposits. The Terlingua district and surrounding areas in Brewster County have yielded a number of uranium deposits of varying sizes: along the contact between the Georgetown and Del Rio formations at the west end of the old Terlingua district; near the top of the Georgetown formation near Adobe Walls north of Terlingua, in Upper Cretaceous beds near Hen Egg Mountain; a mineralized calcareous tuff from the Sheep Canyon basalt (early Tertiary); a mineralized fresh water limestone in the Pruett formation (early Tertiary); Tertiary sandstones west of Lajitas; and mineralized carbonaceous wood fragments in Tertiary rocks north of Agua Fria Mountain.

(B) Although no known deposits or discoveries of uranium minerals have been reported, the general area

of the outcrop of the coal-bearing Upper Cretaceous San Carlos formation north of Candelaria in Presidio County offers good environment for uranium accumulation.

(C) Waters and tufa deposited by Indian Hot Springs in the southern part of the Quitman Mountains are known to be abnormally radioactive and thick sequences of Lower Cretaceous conglomeratic sandstones in the southern Eagle and Quitman Mountains would seem to offer excellent host rocks.

(D) An occurrence of uranium minerals in the Pre-Cambrian rocks in the foothills of the Sierra Diablo north of Allamoore in Hudspeth County indicates further prospecting could discover commercial deposits of uranium.

Uranium mineralization is known to accompany base metal, silver, and gold minerals in the old mining districts, which was overlooked during earlier mining operations.

Two Important Deposits

Area 3, the Triassic rocks outcropping east of the Llano Estacado of the Panhandle and South Plains, is considered one of the best regions of Texas for uranium prospecting. The Dockum group of Triassic rocks is exposed along the escarpment of the Llano Estacado (High Plains). They are terrestrial in origin and bear marked similarity to the Triassic rocks of the Colorado Plateau which are prolific uranium producers. Numerous deposits of uranium ores have been found in these formations, most of which are in Dickens, Garza, Crosby, Kent, and Briscoe counties, where the ore is a loosely consolidated mudstone or conglomeratic, carbonaceous material deposited along old east-west trending stream channels formed on top of the Triassic beds and later covered by younger beds. Two rather important deposits of uranium have been found, one in northwestern Garza County and the other in west-central Briscoe County, in which the ore has assayed over 2.0 percent uranium oxide. In Nolan and Fisher counties, selected carbonaceous plant fragments from a Triassic siltstone are strongly radioactive and a discontinuous exposure of Triassic rocks along the Pecos River canyon in Ward, Reeves, and Pecos counties has shown abnormal radioactivity.

Also Found in Oklahoma

On the surface, *Area 4* consists of Permian red and gray sandstones of the Wichita and Clear Fork groups and, generally, offers minor opportunities for uranium accumulation. Plant debris, fossil wood fragments and leaves provide good "hints" for the uranium prospector. Commercial-grade uranium has been discovered in similar formations across the Red River in Cotton County, Oklahoma, from Wichita and Clay counties, Texas, where increased radiation also has been reported locally.

Area 5 is made up of the Devonian, Mississippian, and Pennsylvanian rocks of the central part of Texas and the Pennsylvanian rocks of north-central Texas. Relatively high radioactivity readings have been reported from a phosphorite layer at the base of the Marble Falls formation (probably Pennsylvanian) in the San Saba County area and in the Devonian shale (Woodford equivalent), neither of which are considered commercially important.

The older Paleozoic rocks of the Central Mineral Region (Llano Uplift), comprising *Area 6*, are not considered at this time to be favorable prospecting horizons and have not shown any areas of increased radioactivity.

During the last few years, the Central Mineral Region (*Area 7*) has received a good deal of attention from uranium prospectors because of the known deposits of radioactive rare earth minerals and the generally high level of radioactivity of granitic bodies. Beginning before 1900 and continuing into the first part of this century, radioactive rare earth minerals, complex compounds containing small amounts of uranium and thorium, were produced from mines in the Central Mineral Region, most of which were from pegmatites. Nearly all of the many pegmatites in this area are strongly radioactive, but there is little possibility of a commercial tonnage of uranium ore in this type of occurrence.

Area 8, composed chiefly of Lower Cretaceous rocks, is that great expanse of limestone hill country known as the Edwards Plateau. Currently, only one uranium district produces from limestone formations, that being Grants, New Mexico, where mineralization seems to be in more porous zones of algal or reef origin. Thus, any uranium concentration in these Lower Cretaceous rocks would seem to favor areas of reefing or areas where asphaltic material is observed in the rocks. A concentration of uranium in an asphaltic limestone coquina of Glen Rose age has been reported in southwestern Burnet County. In Upton County, about two miles northeast of McCamey, uranium has been reported in the Edwards limestone. Samples of Trinity sandstone from western Upton County and eastern Crane County show carnotite-type mineralization. Also, increased radioactivity has been found in an iron-stained sandstone, probably Trinity, in Comanche County, east of Newburg.

Area 9, an arcuate band of Upper Cretaceous limestones, shales, and marls that follows the Balcones escarpment, is considered unfavorable for uranium deposition and no areas of increased radiation have been found.

Discovery in Jackson Sandstone

Area 10 is composed principally of sandstones and shales, usually poorly consolidated, of Tertiary age. Fossil bones from localized areas in the Oakville and Fleming formations (lower and middle Miocene age, respectively) have shown strong radioactivity and may indicate that future prospecting will reveal commercial deposits of uranium. The Lower Eocene Wilcox group of rocks contains numerous beds of lignite and associated sandstone, which seems to present the desirable source-and-reservoir condition. Also within this Tertiary sequence, there are layers of partly or entirely volcanic origin: tuffaceous sandstones, tuffs, and bentonitic rocks. A seemingly important discovery of uranium ore has been found in northwestern Karnes County, near the Wilson County line, where Jackson sandstones are in contact with the Catahoula tuff. Unverified reports have indicated this ore may assay as high as 8.0 percent uranium oxide. Several other minor occurrences of uranium have also been reported.

The Pleistocene rocks of the Gulf Coastal Plain, which make up *Area 11*, are primarily unconsolidated sediments and are not considered favorable for uranium accumulation. No areas of increased radioactivity have been reported from this region.

Mining in Two Counties

Uranium production in Texas is currently at a standstill, due to the fact that there are no mills or buying stations in the state. It has been reported, however, that uranium ores are being mined and stock-piled in several areas, chiefly Karnes and Brewster Counties. It is felt by most observers that the location of a mill or buying station in areas where some ore has already been discovered would provide the needed incentive to increase exploratory work and uncover other commercial deposits of uranium.

United States

Personalities in the News

Leo Miller, former member of the United States Atomic Energy Commission geology staff at Grand Junction, Colorado, has joined Pick Uranium Company as director of exploration and geology. He will be in charge of exploration and development on all of the Pick properties and will maintain an office in Grand Junction. **Vernon J. Pick** recently announced that he is establishing a research laboratory at Palo Alto, California near the Stanford University campus to carry on studies of peaceful uses of atomic energy.

Robert G. Kenly has been elected a vice president of The New Jersey Zinc Company, New York City. He has been vice president of The New Jersey Zinc Sales Company since 1951 and will continue to supervise the activities of that unit.

F. L. McDonald, administrative assistant to the plant manager at Brewster, Florida, has been named assistant plant manager of American Cyanamid Company's Florida phosphate mining operations. He will continue to maintain offices at Brewster.

James S. Starks, Jr. is new plant manager for Magnet Cove Barium Corporation's Magnet Cove-Malvern operations. Former mill superintendent **Richard J. Menze** has been named assistant plant manager. Replacing Mr. Menze is **Eugene H. Spraggins,** former assistant mill superintendent. **Harry M. Verser** was named mine superintendent.

James F. Roe has been promoted to assistant manager in charge of production for the Bonnie plant of International Minerals & Chemical Corporation at Bartow, Florida. He replaces **Neil B. O'Donnell,** who has accepted a position with Kaiser Aluminum Company, Baton Rouge, Louisiana.

Philip L. Merritt, senior geologist of E. J. Longyear & Company, was elected a director of Sodak Uranium & Mining Company, Inc., South Dakota and Wyoming uranium producer. Dr. Merritt is former assistant director for exploration of the United States Atomic Energy Commission's division of Raw Materials. During World War II, he served as chief of raw materials for the U. S. Army Corps of Engineers' Manhattan Project.

VERNON L. MATTSON, formerly director of the Colorado School of Mines Research Foundation, Inc., has been named to the newly created post of Manager of Mining and Ore Processing, Kerr-McGee Oil Industries, Inc. Dr. Mattson, who has served Kermac as a consultant in the past, will direct activities of the company in metallurgical research, uranium mining and milling, and the mining and processing of potash. His offices will be located in Denver, Colorado. For the past two years he and his staff have authored the review of the mining industry in the MINING WORLD Yearbook which appears each April.

John G. Hall, formerly an official of Chief Consolidated, has been appointed plant manager of National Lead Company's MacIntyre Development in Tahawus, New York. He succeeds **Paul W. Allen,** who resigned to direct the domestic mining operations of Cyprus Mining Company.

A. E. Millar, general manager of the Anaconda Company's Yerington mine at Weed Heights, Nevada, recently toured the Mesabi Iron Range in Northern Minnesota. He visited many of the large mining properties in the area for the purpose of studying methods and equipment that might be applied to the Yerington mine.

S. A. Montague, Spruce Pine Mica Company, Spruce Pine, North Carolina, was elected president of the Mica Fabricators Association in New York City recently.

A. M. Wilson, staff member for Utah Construction Company, San Francisco, California, recently inspected mining and milling operations on the Mesabi Range in northern Minnesota.

EVERETT L. JOPPA has been named general manager of mines of Pickands Mather & Co., Duluth, Minnesota. He has been with Pickands Mather since 1928 when the firm acquired the Mahnomen mine from the C. K. Quinn Company. He also served as an engineer for Oliver Iron Mining Company. In 1948 he was made general superintendent of the Hibbing district and was appointed operating assistant in 1950.

Thomas J. Hubbard has been named general master mechanic of the Magna Mill, Utah Copper Division, Kennecott Copper Corporation. He previously was maintenance and construction engineer at the Hurley plant in New Mexico.

Ross D. Leisk, president of the Idaho Mining Association and vice president and general manager of Sunshine Mining Company, has been awarded an honorary degree of doctor of engineering by the Michigan College of Mining and Technology.

John G. Barry and **Arthur E. Granger** have been added to the Grand Junction Operations Office staff of the United States Atomic Energy Commission. Mr. Barry will serve as staff engineer, and Mr. Granger will act as chief of the geologic branch.

Thomas D. Henderson, mill superintendent at the Copper Cities Mining Company, Miami, Arizona, has been awarded the professional degree of metallurgical engineer from the University of Arizona at Tucson.

Louis H. Roddis, Jr., formerly senior assistant to the chief of the Naval Reactors Branch, has been appointed deputy director of the division of reactor development, United States Atomic Energy Commission, Washington, D. C. Named deputy directory of the division of licensing was **Frank K. Pittman,** formerly with the division of production.

JULIAN C. ASHBY (right), former district geophysicist for the Atlantic Refining Company, has been appointed general manager of Utex Exploration Company, Moab, Utah. He has been serving as chief geophysicist for Utex since the first of this year. According to CHARLES A. STEEN, president of Utex, the appointment came as a result of the growth of his organization which made it necessary for him to secure assistance in managerial duties. Mr. Steen had been acting as general manager. (See Page 69 for details on new uranium mill to be built in Moab by Utex and Uranium Reduction Company.)

L. J. Hartzell has succeeded **Jim McKay** as chief chemist at Manganese, Inc., Henderson, Nevada. Mr. Hartzell came to Manganese from Pioche Manganese Company. Before that time he served with the Anaconda Copper Company and Combined Metals Reduction Company.

Consolidated Coppermines Corporation, Ely, Nevada, has awarded the 1955 Coppermines' Foundation, Inc. scholarship to **Thomas Gardner Keegan** of Ely. The scholarship is awarded to a resident of White Pine County each year by the company.

H. W. Norman, formerly a geologist for the United States Atomic Energy Commission in the Spokane, Washington area, has resigned that post to become geologist for Daybreak Uranium, Inc. and Morning Sun Uranium, Inc. Before joining the AEC three years ago, Mr. Norman was district geologist for the Wisconsin geological survey and mines geologist at the Star Mine, Burke, Idaho.

A. J. Martin, United States Bureau of Mines, has been transferred from the Denver, Colorado office to the Bureau's headquarters in Washington, D. C.

Four managerial appointments in the chemical development division of Climax Molybdenum Company have been announced. **Elwin E. Smith** has been named manager of lubricant development, **George S. Cripps** has been appointed manager of agricultural development, **Herbert Kay** was named manager of new chemical development, and **Benjamin Danziger** has been appointed manager of catalyst and pigment development.

George Gedge is the new safety engineer for the Copper Queen branch of Phelps Dodge Corporation, Bisbee, Arizona. Previously, he was safety director for Calumet & Hecla Consolidated Copper Company at Calumet, Michigan.

James H. Jensen has joined American Potash & Chemical Corporation as an advisory engineer at the company's main plant in Trona, California.

Clarence E. Ulrey, of Grand Junction, Colorado has received a Commendable Service award from the Department of the Interior for his work at the Bureau of Mines Oil Shale Demonstration Plant at Anvil Points, Colorado. He retired from government service this year after serving for many years at the Oil Shale Plant as an auto mechanic.

Leon M. Petryck has joined the Development and Research Division of the International Nickel Company, Inc., as a research metallurgist in the welding section of the Research Laboratory, Bayonne, New Jersey.

J. Scott Griffith, Armour Research Foundation, Illinois Institute of Technology, has been promoted from supervisor to assistant manager of the ceramics and minerals research department. Mr. Griffith, who joined the staff as an assistant mineralogist in 1941, has been active in refractories research.

Donald W. McGlashan, research professor and head of the department of mineral dressing at the Montana School of Mines, was awarded the professional degree of metallurgical engineer by the University of Idaho.

James H. Elliot, secretary of Calumet & Hecla, Inc., Chicago, Illinois, has retired from the firm. He has been succeeded by **Albert E. Petermann,** vice president and general counsel. Mr. Elliot served 12 years with the metal fabricating and copper mining concern.

Gordon I. Gould, geologist and mercury authority, has returned to San Francisco, California, following an examination of a mercury prospect in western Alaska.

Robert W. Shearman is now metals branch secretary of the American Institute of Mining and Metallurgical Engineers in New York City.

Edward L. Clark, Missouri state geologist, has resigned to accept a position as vice president and board member of the Four Corners Uranium Company, Grand Junction, Colorado. He has also been elected to the board of the Moreno Oil and Uranium Corporation of Colorado. **Garret A. Muilenburg** has been acting state geologist during Dr. Clark's absence.

William P. Drake has succeeded **George B. Beitzel** as president of the Pennsylvania Salt Manufacturing Company, Philadelphia, Pennsylvania.

Denton A. Schriver, Vanadium Corporation of America, was recently named secretary of the company.

J. Carl Behler, Minerals Processing Company, LaGrange, Georgia, has been elected president of the company. Minerals Processing has mica, beryl and quartz properties in the LaGrange area and in North Carolina.

Odin A. Sundness, vice president of Snyder Mining Company, Duluth, Minnesota, retired during May. A veteran of the mining industry in the Lake Superior region, he had served in past years with the Oliver Iron Mining Company, and the Shenango Furnace Company.

OBITUARIES

James F. McClelland, 77, retired vice president and director of Phelps Dodge Corporation, died at his home in Greenwich, Connecticut on May 6. Besides his activities with Phelps Dodge which date back to 1931, Mr. McClelland taught geology and mining at several universities and worked in the Nevada mining area during the early part of the century.

John Sekulic, 63, president of Lucky Friday Silver-Lead Mines Company, died June 11 following a long illness. Since 1937 he had developed the Lucky Friday mine east of Mullen, Idaho from a prospect to one of the Coeur d'Alene mining region's major producers. He was also a director of Golconda Lead Mines, which had helped finance the early Lucky Friday shaft.

Harry Townsend, 69, Seattle, Washington and Alaska mining geologist, died June 7 in Ketchikan, Alaska. A former president of the Seattle Branch, American Institute of Mining and Metallurgical Engineers, Mr. Townsend maintained offices in Seattle and headed an engineering firm whose activities extended into Alaska and Canada.

Howard R. Huston, 62, retired vice president and director of American Cyanamid Company, died June 8 at Truro, Massachusetts. Mr. Huston had retired from American Cyanamid May 30 and was serving the company as a consultant.

Dudley D. Homer, 68, former American Metals Corporation official and Nevada mining man, died in Manson, Massachusetts in May. He had served as general manager of the Matahambre copper mines in Cuba for many years and was vice president in charge of South American mining activities for American Metals.

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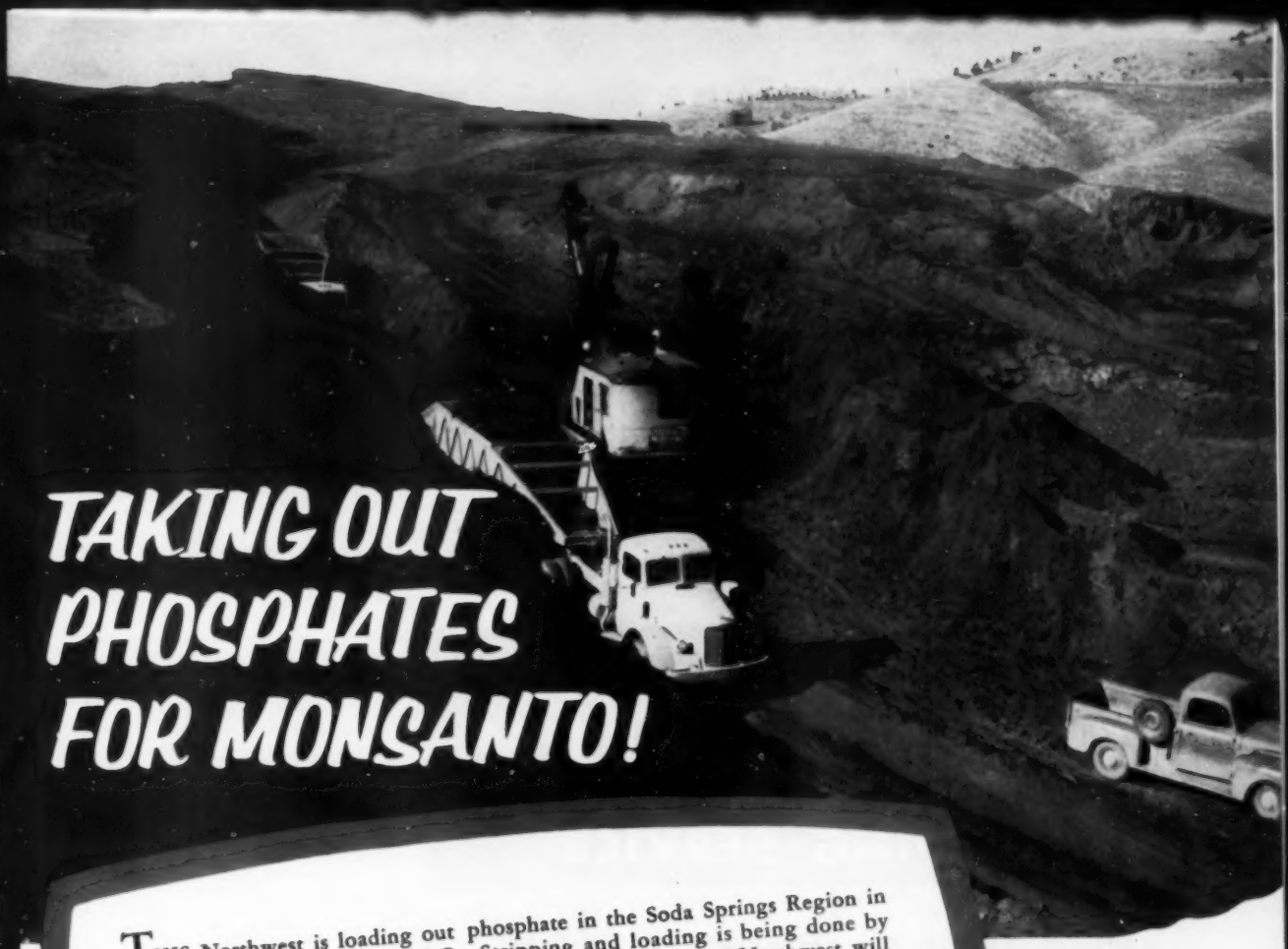

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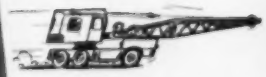

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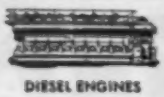

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Newsmakers in International Mining

GEORGE T. SCHOLEY and associates have formed a new geologic and mine development firm in the Philippine Islands. The company, Philex Mining Corporation, will fill the gap that now exists in the Philippines between a jungle prospect and a partially development mine by conducting exploration and development programs. Geological consulting will be an important part of the firm's operation. Mr. Scholey (right) will be general manager and chief engineer, PAUL SCHAFER, vice president and chief geologist, and HENRY BRIMO, president. Mr. Scholey has been chief engineer for A. Soriano y Cia and Atlas Consolidated Mining & Development Corporation; Mr. Schafer is a well-known consulting geologist, and Mr. Brimo is president of Baguio Gold Mining Company.

Arnold H. Miller, consulting engineer, New York City, has been on an assignment in Mexico.

Merle H. Guise, consulting engineer, has been touring various parts of Asia during the past few months. He inspected uranium operations in Australia, and visited mining areas in Indonesia and Malaya, where he mined shortly after World War I.

T. J. Lawson has resigned as mill superintendent of Itogen Mining Company, Mountain Province, Philippine Islands. He has been replaced by **R. E. Hull.**

Veikko Okko has been appointed president of the Geologiliitto r.y., Finnish geological association, for 1955.

C. L. Elliot, formerly metallurgist for Benguet Consolidated Gold Mining Company, Mountain Province, Philippine Islands, has been promoted to the position of assistant general superintendent. He succeeds **John F. Dana,** who has returned to the United States. **R. W. Gorler** was named mill superintendent, **A. J. Farreta** has become general mine superintendent, and **W. J. Pearson** has been advanced to mine superintendent at the Antamok operations.

Gunnar Kautsky, Sweden, has been appointed state geologist at Sveriges Geologiska Undersokning. **Carl Gladenius,** former state geologist, has been named corresponding member of Istituto Italiano Di Paleontologia Umana, Rome, Italy.

RUSSELL R. BRYAN, JR., Orinoco Mining Company, Bolivar, Venezuela, has resigned his post as mine superintendent and is forming an association of Latin American mining and construction consultants. He has been engaged in Latin American mining activities since 1940, and in 1948 was employed by the United States Steel Corporation as a geologist and mining engineer for their Venezuelan iron ore exploration. He has been associated with this project since that time.

Olof Holtedahl, Oslo, Norway, has been awarded the Leopold von Buch plaque by Deutsche Geologische Gesellschaft for his geological research in Norway and the Antarctic.

Herman Reusch, president of the Gute-Hoffnungs-Hutte Oberhausen A. G., West Germany, made a recent trip to Peru during which he conferred with members of Peru's mining and coal industries. His firm is one of the largest iron processing companies in Germany.

Walter K. Scheibe is assistant manager at the Liberia Mining Company, Ltd., Monrovia, Liberia, West Africa.

Amorn Methikul and **Damner Sithiprasasna,** geologists with the Royal Department of Mines, Bangkok, Thailand, and **Ignacio Antonio,** geologist with the Philippines Bureau of Mines, are in the United States participating in the government technical assistance program. They have just completed a course of instruction in the manufacture and use of diamond core drilling equipment under the auspices of E. J. Longyear Company, Minneapolis, Minnesota.

R. D. O'Brien, Eimco Corporation official in Japan, has completed a business trip to Ceylon, India, and Hong Kong.

John W. Hanley, Cerro de Pasco Corporation, is serving as coordinator of the firm's zinc program with offices in New York City. He is a veteran of more than 20 years with Cerro de Pasco in Oroya, Peru, most recently serving as assistant to the manager of operations.

W. C. Lacy, chief geologist for Cerro de Pasco Corporation at Oroya, Peru, has joined the faculty of the University of Arizona as a professor of geology.

Robert L. Loofbourow, United States consulting engineer, was in the Philippine Islands in June making an evaluation of the Toledo mine of Atlas Consolidated Mining & Development Corporation. His work included an appraisal of the mine's reserves and output of copper and other minerals. Estimated total tonnage treated at the mine in June was 110,000 dry short tons of ore. During the week of June 18 average daily production was 4,000 tons.

James G. Henderson, who has completed an assignment for the United States Atomic Energy Commission in an exploration trip to South America, has returned to the United States.

Howard M. Fowler, Vancouver, British Columbia, is now engaged in consulting and exploration work in British Columbia and Alaska.

Kenneth P. Larkin, mining engineer, has returned to the United States after three years with the Andes Copper Mining Company, Potrerillos, Chile. He is now located at Casper, Wyoming.

MICHAEL A. KURYLA has been named assistant manager of the Lima, Peru division of the Cerro de Pasco Corporation. His duties will include evaluating prospective mining ventures in Peru, where Cerro de Pasco already ranks as the country's largest nonferrous mining enterprise. Mr. Kuryla served most recently as director of safety and employee services for the United States Smelting and Refining Company, Salt Lake City, Utah, and formerly was engaged as a mine and mill superintendent by Cia Real del Monte y Pachuca, Pachuca, Mexico.

Eugene Pfleider, head of the department of mineral engineering, University of Minnesota, is touring various schools of mining in Sweden, Germany, France, and England this summer. While in France, he attended the Centenary Congress of the Societe De L'Industrie Minerale in Paris.

R. J. Hawkanson, chief engineer of iron mines on the Mesabi iron range, Pickands Mather & Co. was recently transferred to Ottawa, Canada to represent the firm in its Canadian exploration work.

C. J. Smithells, director of research for the British Aluminum Company, will take up the appointment of managing director for Magnesium Elektron Limited. He was recently named to the board of directors for the firm. He will continue to act in a consulting capacity to British Aluminum but has been succeeded as director of research by **T. G. Pearson,** assistant director.

George N. Bourret, chief geologist for Utah Construction Company, returned to the United States after an inspection of various mining properties in Peru.

Four leaders of the French iron mining industry have completed a study of safety procedures and haulage and maintenance operations at United States mining operations. The visitors, whose trip was under the auspices of the Chambre Syndicale des Mines de Fer de France, were: **Louis Lapierre,** Mines de Murville; **Pierre Listrat,** Mines de Michaville; **Andre Winterberger,** Mines Orne-Pauline; **Maurice Ladure,** Mine Terres-Rouges.

CHARLES M. SMITH, manager of the mining department of A. Soriano y Cia and vice president of Atlas Consolidated Mining and Development Corporation, has returned to the Philippines after a trip to the U.S. One purpose of his recent trip was to hire mining engineers for Soriano's expanded Philippine program. Atlas is the owner-operator of the Toledo copper mine on the island of Cebu and is also undertaking an ambitious exploration program in the Islands.

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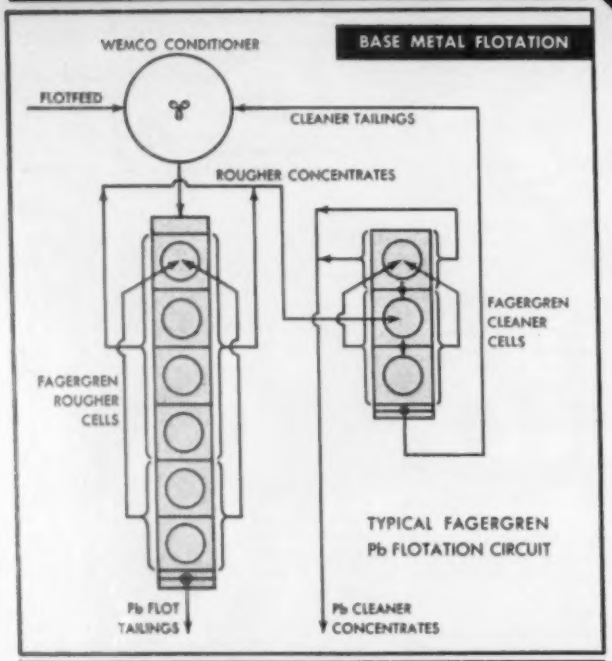

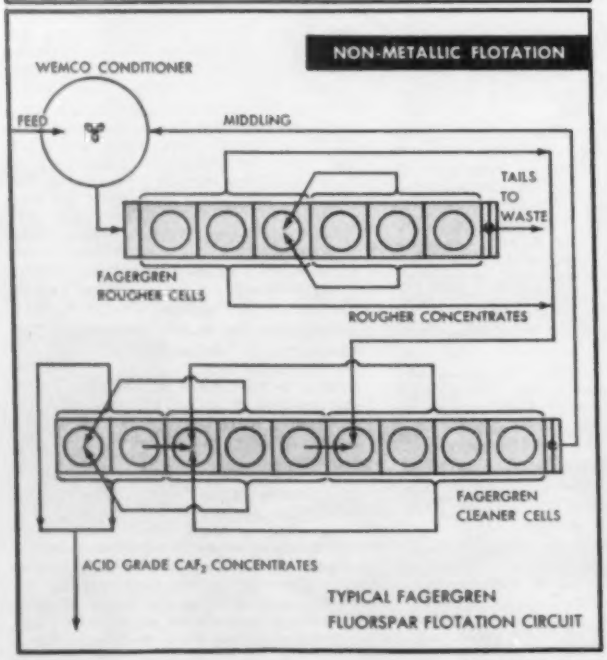

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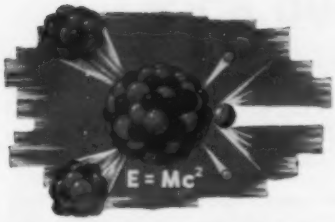

FISSION FACTS

Monthly Roundup of Mining News In the Atomic Energy Field

Financial Leaders Form Nevada Uranium Company

Treasure Uranium & Resources, Inc., a Nevada-chartered firm, has been organized by a group of Utah's leading financial figures. Interests include leases and claims on uranium lands in Canada, New Mexico, Wyoming, and Utah.

Among directors of the firm are: Marriner S. Eccles, former chairman of the Federal Reserve Board; George S. Eccles, president of First Security Corporation; Marriner A. Browning of Browning Arms; and Leland B. Flint, president of Flint Distributing and a director of Kennecott Copper Corporation.

President is Ken Garff, Salt Lake City, Utah; vice president is W. H. H. Cramer, president of New Park Mining Company and Lucky Mc Uranium Corporation.

Tide Water Prospecting For Uranium in Arizona

Tide Water Associated Oil Company recently concluded a lease with the New Mexico & Arizona Land Company which enables the oil firm to prospect for uranium on 250,000 acres, one point of which comes within 12 miles of Anaconda Company's Jackpile uranium mine north of Laguna, New Mexico.

A substantial bonus has already been paid to the land company, and Tide Water expects to spend a minimum of $400,000 for exploration and $400,000 on mining operations within the next two years. The company has 60 days within which to engage in mining after commercial grade uranium is found. Thereafter, the land company has the right either to become a 50 percent partner, sharing in mining costs, profits, and losses, or it can accept a royalty arrangement.

The Tide Water uranium lease does not include oil and gas rights.

Alaska Uranium Reported On Prince of Wales Island

Commercial-grade, uranium-bearing ore has been discovered in Alaska, the Territorial Department of Mines reports. The area is located near the southern end of Prince of Wales Island, and two husband-and-wife teams have already staked claims and contacted a Colorado uranium company.

Actual discovery was made last May by Jan and Don Ross, flying aerial reconnaissance with a Nucliometer instrument mounted in a Piper Cub aircraft. Encouraged by a strong aerial anomaly, the Rosses landed and staked the first claim. Judy and Kelly Adams were then flown into the area, conducted radiometric ground surveys, blazed trails, and set up a camp.

Engineers have been sent to the property by the Colorado firm contacted by the Adamses and Rosses and a deal is now pending. No tonnages have been blocked out yet, but Department of Mines officials say the ore is definitely commercial grade. The discovery is one of four or five known occurrences of uranium minerals in southeastern Alaska.

Wyoming Prospectors To Fight Land Closure

A National Association of Prospectors has been organized in Cheyenne, Wyoming by attorney Bernard E. Cole. The association is a result of the recent dispute over scheduled opening of the Pumpkin Buttes area in Wyoming to prospecting and subsequent cancellation of the opening when it was feared there would be violence between ranchers and prospectors.

Mr. Cole has criticized the U.S. Department of the Interior for closing the lands and says that his organization is "designed to protect the rights of the prospectors." The Pumpkin Buttes area was scheduled to be reopened to the public domain after several years of U. S. Atomic Energy Commission geological investigation in the region. (See MINING WORLD, June 1955, page 90.

The Moab Mill: Steen's Ore and Snyder's Know-How

CHARLES A. STEEN

EDWARD H. SNYDER

RICHARD A. YOUNG

Construction is now underway at Uranium Reduction Company's ore processing plant three miles west of Moab, Utah. The mill will cost an estimated $8,000,000 and will be managed by American Zinc, Lead & Smelting Company, St. Louis, Missouri.

The plant, adjacent to the United States Atomic Energy Commission sampling station currently operated by American Smelting & Refining Company, will employ the relatively new resin-in-pulp process, utilizing sulphuric acid, which was developed by the AEC in its research work at Grand Junction, Colorado.

Uranium Reduction Company was organized by Charles A. Steen, president of Utex Exploration Company, and Edward H. Snyder, president of Combined Metals Reduction Company, who heads the new firm. A contract has been signed with the AEC, which will receive the entire production from the mill until March 31, 1962. Ore will come from Mr. Steen's Mi Vida Mine, as well as from other uranium operations in the Big Wash district.

Richard A. Young, vice president of American Zinc, will serve as general manager of the plant.

Foley Brothers, Inc., Pleasantville, New York, has been contracted to construct the mill. A substantial daily bonus will be paid for completion of the plant ahead of the contract date. It will be ready for operation in approximately 15 months and will have its own sampler. It will act as a custom buyer of ores, and an estimated 125 to 175 persons will be employed at the plant.

Directors and officers of the company are Mr. Snyder, chairman; Mitchell A. Melich, president; Mr. Steen and Mr. Young, vice presidents; E. T. Foley, Percy M. Stewart, and Howard I. Young, president of American Zinc, directors.

Headquarters for Uranium Reduction have been set up in Moab, and purchasing officers are located in Salt Lake City, Utah. Besides the Moab mill, the firm owns the Wanda and Cherie groups of claims north of the former Big Indian Mines, Inc. property. This latter operation is now jointly run by Uranium Reduction and Standard Uranium Company, of which Mr. Steen is a principal stockholder. Uranium Reduction is planning to invest $500,000 in the development of the Big Indian Venture, which adjoins holdings of Utex Exploration.

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ENGINEERING BOOKS:

Views and Reviews

LOST MINES AND BURIED TREASURES ALONG THE OLD FRONTIER—Desert Magazine Press, Palm Desert, California, 240 pages, 18 illustrations, 50 index maps. $5.00.

For many years MINING WORLD readers have requested a book which incorporates, in one place, the series of Lost Mines and Buried Treasures stories which have been of such great interest as they were published. Now John D. Mitchell has collected and printed 18 of the MINING WORLD stories and added many of those

Residents of the southwest and seekers of lost mines will know many of the places and buried treasures reported in this new book. How familiar are the names "Lost Apache Gold Mine," "Buried Treasurers of Don Felipe," "Cave of the Golden Sands," and many more.

MINES AND MINERAL RESOURCES OF AMADOR COUNTY, CALIFORNIA—By Denton W. Carlson and William B. Clark. Report by the State of California's Division of Mines, *California Journal of Mines and Geology*, January 1954, Vol. 50, No. 1, 136 pages, 29 figures, county map showing geology and mine locations. $1.00.

More than $165,000,000 worth of mineral products—most of it gold from the tremendously wealthy lode mines—has come from the county since 1880, when accurate records were begun. Many of the gold mines were in operation well before 1880; the total production of gold alone, including that taken in the early gold-rush days, probably far exceeds the recorded sum. The small segment of the Mother Lode lying between Jackson and Plymouth—a distance by highway of 12 miles—has been the richest segment of the entire 115-mile length of the lode; along it are the Kennedy, Argonaut, Keystone, Plymouth, and Central Eureka mines, famous names in California mining.

Accompanying the report on Amador County is the Annual Report of the State Mineralogist, Chief of the Division of Mines for the 104th fiscal year, which gives a summary of the progress of the Division for that year. A statistical summary of the mineral commodities in 1951 is another section of the new journal.

BLAZING ALASKA'S TRAILS—By Dr. Alfred H. Brooks. Joint publication by the Arctic Institute of North America and The University of Alaska, 517 pages, interesting and historical pictures. $4.50.

Dr. Brooks, a famous Alaskan explorer, scientist, and historian, was well qualified to write the book by virtue of having headed the United States Geological Survey in Alaska for 25 years.

Blazing Alaska's Trails is a complete record that covers all phases of Alaskan life up to 1920. Included in the book are 10 chapters on Alaskan history, six on mining and the mining industry, one each on the flora, fauna, geology, gengraphy, climate, native inhabitants, early transportation, fisheries, agriculture, education and government in Alaska. The material is presented in a very readable and enjoyable manner.

Publication of the book was undertaken jointly by the Arctic Institute of North America and the University of Alaska after the original manuscript was given by Mrs. Brooks.

Copies of any of these books may be purchased from *Mining World*, 121 Second Street, San Francisco.

Japanese Mine Strike Ends; Forecast of 1955 Production

A crippling 43-day labor strike which paralyzed Japanese non-ferrous mines, mills, smelters, and refineries ended on June 17 after days of negotiations between company officials and union leaders. Final settlement of this, the longest post war labor strike in Japan, called for a special 1,000 yen payment per worker with a daily base wage of 420 yen per work man. The official exchange rate is 358.5 yen per U. S. dollar.

Because of the strike against the Mitsubishi Metal Mining Company, Japanese Mining Company, Mitsui Mining and Smelting Company, Furukawa Mining Company, Dowa Mining Company, and Sumitomo Metal Mining Company the production of metals in metric tons in May declined as follows from the normal figures in brackets: Electrolytic copper, 7,391 (9,894); electrolytic lead, 2,099 (3,094); electrolytic zinc, 4,285 (6,492); retort zinc, 2,413 (3,260).

At the end of this strike an appraisal can be made as to what the production of these metals can be for the rest of 1955 and what total production in Japan in 1955 is likely to be attained.

Estimates are as follows:

Electrolytic copper from April to December, including exports to Argentina, 60,400 metric tons. If this can be attained, yearly output will be 88,500 metric tons compared with 106,478 in 1954. This amount will be enough for Japanese use plus contracted exports to Argentina.

Lead output to the year's end is estimated at 22,100 tons, and the planned production of 36,720 tons for the entire year can be attained. Zinc output should be 65,400 tons, which will make year's output less than planned. However, consumption is also down.

COMINCO's HB Lead-Zinc Mine Now In Operation

Consolidated Mining and Smelting Company of Canada Ltd.'s H.B. lead-zinc mine at Salmo, British Columbia, is now operating and shipping of concentrates has started.

Underground development and new mine buildings, including a 1,000-ton capacity concentrator, were completed on the site in 1953 at a cost of $3,000,000 but the property was not brought into production at that time because of low base metal prices.

The H.B. ore body is a low-grade, lead-zinc deposit which lends itself to long blast hole drilling. Ore raises have been driven to carry the broken ore down to a 4,000-foot haulage tunnel at the 2,800-foot level. A 40-horsepower Diesel locomotive is being used to haul the ore through the haulageway to the concentrator.

Concentrates are being trucked from the mine to the Trail smelter by a Salmo contracting firm. Both mine and concentrator are working a 24-hour schedule with the mine operating on a five-day week and the concentrator on seven.

The original H. B. claims were staked in 1910 by P. F. Horton and J. A. Benson. The property changed hands several times between 1910 and 1927 when it was purchased by COMINCO. It remained idle from 1927 until after World War II when an extensive diamond drilling and exploration program resulted in the discovery of a large tonnage of ore.

Bigger Aluminum Output Seen for European Nations

Aluminum production is on the upswing in several European countries, with new fabrication plants and increased output announced for Norway, West Germany, Austria, and Italy.

It is believed that production in Norway may reach 200,000 tons this year. Among the firms announcing plans for expansion of primary aluminum capacity is Det Norske Nitridaktieselskap, owned jointly by the French firm of Pechiney, British Aluminium Company, Ltd., and the Canadian company, Aluminium Limited. Present capacity is 20,000 metric tons per year; this is to be raised to 26,000 tons in 1956, with further expansion contemplated for subsequent years. The total program will cost approximately 55,000,000 kronor.

Plans for construction of a new aluminum plant at Mosjoen in the northern part of Norway have been announced by Elektrokemisk A/S. A Swiss company reportedly may assume a one-third ownership in the plant. Initial output would be 20,000 tons annually with an eventual production of 60,000 to 80,000 tons per year. Total cost is estimated at between £5,000,000 and £6,000,000. The Norwegian government has authorized 50,000 kilowatts of power from the Rossaga hydro-electric station, which was built primarily to furnish power for the Mo i Rana steel plant.

West German foundry aluminum production totaled approximately 55,600 tons for the first five months of this year, a 10 percent increase over the corresponding period in 1954. The Vereinigte Aluminium Werke AG, state-owned producer, is rebuilding its plant at Erft, which was dismantled at the end of World War II. Upon completion of this project the firm's output is expected to reach 17,000 tons annually. (This would still represent only 50 percent of its prewar capacity.)

The Austrian government is making plans to construct a new aluminum products fabrication plant in the Triesting Valley of Lower Austria at an estimated cost of 25,000,000 schillings ($1,000,000). Site of the plant may be adjacent to the Russian-controlled Enzesfelder Metallwerke AG plant, which, it is hoped, will eventually be turned over to the Austrian government and operated jointly with the proposed new plant.

A fabrication plant near Naples, Italy began operations in July. It is run by Societa Lavorazione Alluminio, an associate of Alsco, Inc., Akron, Ohio.

To Mine Lead and Zinc In French Morocco

A new firm has been organized to mine lead and zinc in the Diebel Aouan area in the Department of Meknes, French Morocco. The Belgian mining concern, Compagnie Royale Asturienne des Mines, has established the new company which is to be known as Societe Miniere du Djebel Aouan. About half of the capital is held by the Belgian group.

50,000-Ton Steel Plant To Be Constructed in Peru

A 50,000-ton steel plant will be constructed in Chimbote, Peru, with production scheduled to begin at the end of 1956.

Contracts have been signed by the Corporacion Peruana del Santa, a group representing the French manufacturers, Etablissements Delatre & Frouard Reunis, and Societe Generale d'Exploitations Industrielles (Sogei) and the Consorcio de Ingenieros covering the project. Technical control will be exercised by Ramseyer and Miller of New York, while the Banque de Paris et des Pays Bas will lend financial aid.

The program calls for expenditure of another $25,000,000 to complete the plant and a hydroelectric plant in Canon del Pato. This brings the total cost of the project, including investments to date, to $42,000,000.

During the first 15 years of operation, the Sociedad de Gestion will run the plant. Corporacion Peruana del Santa and the contractors share equally in the new firm. Later the mill and power plant will revert to the Corporacion.

It is reported that the plant will process iron ore from the Marcona mine, The Utah Construction Company presently has a contract with the Peruana del Santa to operate the property. It reverts to Peruana after 20 years.

Large-Scale Developments Planned for Chilean Mines

The Chilean government has authorized a $3,000,000 investment for the development of the Sagasco copper mine in the province of Tarapaca where annual output of copper is expected to total about 15,000 tons. The first $400,000 of the total investment will be used to finance construction of a pilot plant for experimental processing of silicate ores, which is the form in which the copper occurs. Full-scale operations will be undertaken only if the pilot plant is successful. Compania Cuprifera Sagasco S.A., who will develop the mine, is owned by United Satamin Mining Company of Canada.

Another $2,000,000 investment has been approved by the government for the Santiago Mining Company. This firm will build a mill, sink a new shaft and equip the La Africana copper mine near Santiago. Production is expected to start within a year and will total some 20,000 metric tons of 25 percent concentrate per year.

Preference is being given to national smelters in processing these ores. The government is considering modernization of the old Chagres smelter in the province of Aconcagua to handle La Africana's output.

Kennecott, Molybdenum Sign Canadian Ore Pact

The Molybdenum Corporation of America and Kennecott Copper Corporation have announced a joint development program of a columbium-tantalum ore deposit in the Oka district of Quebec, Canada, 25 miles southwest of Montreal on the St. Lawrence River. Directors of

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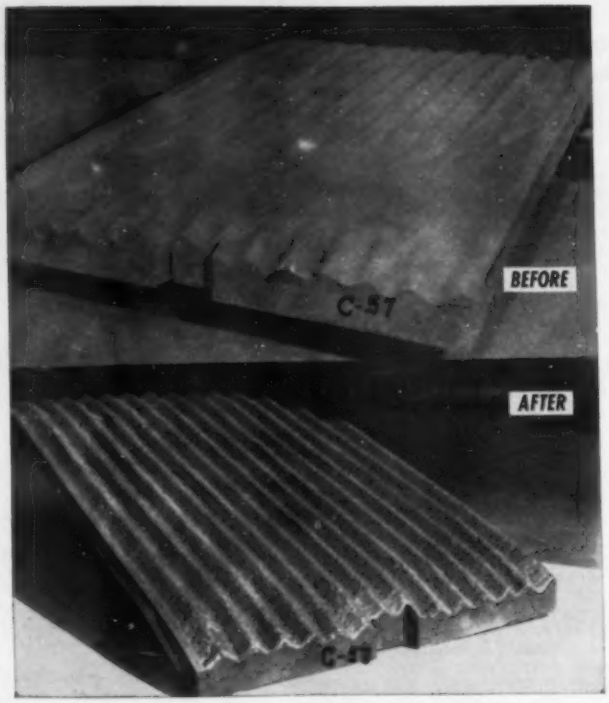

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both companies have approved an option for Kennecott to acuqire a 51 percent interest in Molybdenum's rights in the Oka property. Kennecott also proposes to buy 50,000 shares of Molybdenum common stock.

Molybdenum Corporation holds the original discoveries in the area. Diamond drilling, together with underground and surface work, has established the presence of considerable reserves. The company owns or has options on about 7,900 acres in the Oka area, and the ore is said to contain columbium-tantalum, iron, phosphorus, and some uranium and thorium. It has been estimated that more than $3,000,000 and two years would be required to bring the property into the production stage. No plans for further development have been announced, but exploration and metallurgical research are being carried on.

Philippine Gold Mines Need More Assistance

Currently being considered by the Philippine Gold Subsidy Board is a proposal to have the Central Bank purchase all gold produced in the Republic, with a direct government subsidy of Pesos 40 per ounce in the case of marginal mines, and Pesos 35 per ounce for over-marginal mines. This would be in addition to the official price of Pesos 70 per ounce. Advocates of this proposal believe that purchase of all of the gold by the bank would eliminate the smuggling of the metal out of the country.

At present the board cannot purchase the entire gold output because it lacks the necessary funds. Money presently available would be enough for only about 30 percent of total output. The source of funds for gold subsidies is specifically limited by law to the direct and indirect taxes paid by the mines, plus funds derived from the sale of gold to the Central Bank.

Among other forms of assistance being considered by the board is a proposal that subsidy assistance be continued for a longer period of time—possibly five years. Another suggested alternative is that producers be given gold certificates instead of money, with the use of the certificates to be regulated. Still another proposal calls for exemption of miners from the minimum wage law.

JAPAN—The *Mitsubishi Shoji Kaisha* of Tokyo has signed a contract with the *Atlas Consolidated Mining and Development Corporation* of the Republic of the Philippines for the sale of iron ore to the Japanese firm. The contract provides for shipment of a minimum of 180,000 tons of high grade iron ore to the Japanese firm annually for a five-year period. Mitsubishi will advance to Atlas $500,000 for development of the *Mati* iron mine in Davao Province, Mindanao; the money will be repaid within two years after commencement of shipments. The Mati mine is expected to be in production by the end of this year.

THAILAND—The United States government reportedly has started negotiations with the Thailand government to renew the tin agreement between the two countries that expired in March 1955. Under last year's contract Thailand supplied 2,400 tons to the U.S. According to the Thailand Director-General of the Mines Department, the new contract would provide for 2,000 to 3,000 tons. Thai tin exports in 1954 were officially estimated at 13,201 metric tons.

MALAYA—Until now, security conditions have prevented *Ampat Tin Dredging, Ltd.* from mining its remaining ore reserves on its Tujoh section. Now, however, the situation is under control and the firm's management has decided to install gravel pump equipment on a selected block of 81 acres where satisfactory values indicate that profitable operations may be possible over a period of five and one-half years at present tin prices. A smaller block is also available for subsequent working by the same equipment but this area carries lower values, and, under the price structure, is marginal ground. Subject to continuing satisfactory security and labor conditions, this gravel plant should be ready to operate by the end of this year.

INDIA—*Tata Iron & Steel Works*, presently expanding its steel capacity from 1,000,000 long tons to 1,300,000 long tons, has representatives in the United States seeking funds from the Export-Import Bank and private firms for another expansion program. The new program would increase capacity to 2,000,000 long tons annually. The Indian government hopes to raise the country's output from 1,200,000 tons to 6,000,000 tons by 1961. Part of this goal will be achieved through state-controlled plants. One is to be built by a Russian group, another by a British group, and a third by the German *Krupp-Demag* combine. Each of these would have a capacity of 1,000,000 tons. Tata's 2,000,000 tons, plus 1,000,000 tons from small producers now turning out about 500,000 tons would provide the additional capacity from private industry.

AFGHANISTAN—The San Francisco firm of *Morrison-Knudsen Company Inc.* is reported to have started work on a mineral survey in the Afghan and Helmund Valleys of South Afghanistan. Terms of the agreement with the government have not been disclosed.

JAPAN—Depletion of the ore body has forced the closing of a phosphate mine on Angaur Island in the Palau group. Its annual output had been about 120,000 tons of phosphate rock, and it is said to have been the only mine of its kind available to Japan over the past 30 years.

KOREA—The following are the final figures for mineral production in the Republic of Korea in 1954.

Commodity	*Grade (percent)*	*Output*
Gold*	100	1,484,430
Silver*	100	1,563,095
Copper†	5-15	7,047
Lead†	40-60	116
Placer gold*	100	143,414
Tungsten†	65-75	3,828
Monazite† (R_2O_4)	10-60	1,005
Molybdenite‡	90	18,859
Bismuthinite‡	30	381,661
Manganese†	35-40	1,582
Nickel†	3-5	140
Barite†	96-99	305
Fluorite†	75-90	8,872
Talc†	60-98	8,326
Pyrophyllite†	—	10,693
Kaolin†	—	9,457
Crystaline†	50-80	13,920
Andalusite† (Al_2O_3)	55-58	25
Iron ore†	45-60	30,996
Limestone†	50	9,007

*grams †metric tons ‡kilograms

JAPAN—The *Mitsui Metal Mining Company* is reported to have signed an agreement with the *British Metal Corporation* to refine 1,500 tons of lead ore a month from Australia. The ore is to be processed in the Miike refinery. The finished product of about 600 tons of lead bullion will be shipped to the British firm. Mitsui is currently producing 200 tons of lead bullion monthly by refining concentrate from India on a similar basis.

MALAYA—*Ayer Hitam Tin Dredging Ltd.* is making arrangements to purchase a large electrically driven deep-digging dredge which, until recently, had been

Israel To Produce Copper from Negev Deposits

Copper production, based on deposits in the Negev, is expected in Israel soon, according to Abraham Dor, chief engineer of the Israel Mining Industries, Ltd. The most promising copper deposits are said to be located in the Timna Valley, north of the Red Sea port of Elat, where the metal was mined in King Solomon's time, and where, according to Mr. Dor, recent exploration disclosed extensive, valuable deposits of copper silicate and copper phosphate. (One of the drill rigs used in this exploration work is shown at right). Mr. Dor reports that the deposits have been proved in an area covering 200 acres, with proved reserves estimated at 12,000,000 tons of ore yielding 180,000 tons of copper. Probable and possible ore reserves are 28,000,000 tons and 60,000,000 tons, respectively. Underground mining would be necessary for most of the deposits, but open-pit mining would be possible over an extensive area since the deposits outcrop and dip underground with a gentle slope. Preliminary estimates indicate that more than 3,000,000 tons of ore (45,000 tons of copper) could be mined economically by this method. Since the Timna deposits consist of oxidized ores, the extraction of copper would best be achieved through sulphuric acid leaching, and the Israeli government is said to have plans for such a plant with a capacity of 4,000 to 5,000 tons a year.

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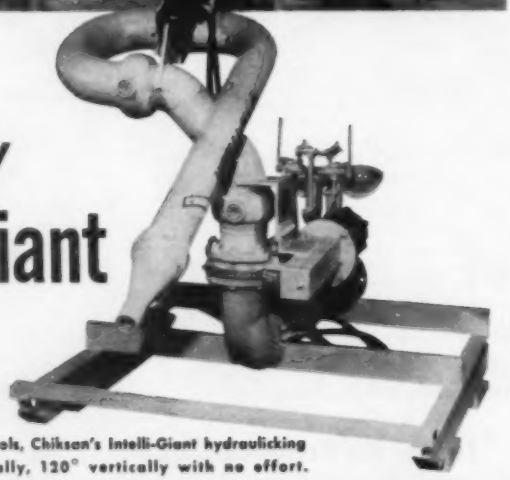

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working a gold dredging area in Australia. The dredge will be converted to suit the company's Malayan conditions, and dismantling work has started.

BURMA—In an effort to speed up development programs, the Burmese government is inviting further foreign investments. New enterprises set up by domestic or foreign investors will be guaranteed against nationalization for an agreed period—normally not less than 10 years. Foreign investors will be permitted to remit current earnings and dividends and repatriation of investment over a reasonable period. The only economic activities to be closed to private investors will be major public utilities and munitions manufacture. The natural resources may be developed by private enterprise in partnership with the government, or under contract to the government.

MALAYA—Great strides are being made in the multi-million dollar Kinta River diviation project in Malaya where the river is being moved into a new channel in order to make new tin-bearing areas available for mining. When completed, the new channel will be 23 miles long. It starts on the outskirts of Ipoh and ends approximately where the Chenderiang River flows into the Kinta River in Lower Perak. The land to be released for mining will consist of the length of the river bed, plus strips of 44 yards on each side of the old river course. The whole area will be approximately 1,250 acres and has an estimated content of 20,000 tons of metallic tin. The state of Perak has an agreement with *Southern Kinta Consolidated* (Kinta Section), *Southern Kinta Consolidated Ltd.* (Penawat), *Southern Malayan Tin Dredging Ltd.*, *Malayan Tin Dredeging Ltd.*, and *Pengkalen Ltd.* requiring each company to undertake to cut and complete a new channel, build weirs, and floodworks as required, divert all roads, move and rebuild all bridges, and do all of this work to an integrated plan. The companies also agreed to pay tribute to the government on all tin mined from the new areas. This money would go into a fund for the maintenance of the new river. A similar agreement with *Lower Perak Tin Dredging* is under negotiation

INDIA—The new silver refinery plant at Calcutta is expected to be in operation by the end of 1956. The German firm, *Demag*, has delivered two shipments of machinery and a third is expected shortly. The plant will extract silver from coins withdrawn from circulation and replaced by nickel coins.

KOREA—An agreement has been reached with the United States on cooperation in atomic energy for peaceful purposes. The agreement is the standard form signed by the U.S. with 24 other nations, calling for the lease of six kilograms of enriched uranium for use in an experimental atomic reactor. Ambassador You Chan Yang has formally requested the U.S. to aid in the construction of an atomic power plant. Korean scientists will be admitted to the Oak Ridge National Laboratory for training.

MALAYA—*Pahang Consolidated Company, Ltd.* has installed an air-conditioning system to control temperature and humidity in its deep and extensive underground workings.

INDIA—During last year, the *Indian Aluminium Company* completed expansion of its Alupuram smelted to double

fts capacity, but the shortage of power seriously curtailed production. The supply of power, however, has since improved. Production at the *Lahardaga* mines and the Muri ore plant was satisfactory. The renovation of old machinery and installation of new additional equipment at the Belur works increased the company's capacity for rolled products, too.

AUSTRIA—The electrolytic zinc processing plant of *Bleiberger Bergwerks Union* at Gailitz, Carinthia was put into full-scale production in July. This is Austria's first zinc refining plant and is expected to eliminate the need for exporting zinc to West Germany for refining. Ultimate capacity of the plant will be 10,000 tons per year.

FINLAND—*Osakeyhtio Vuoksenniska Aktiebolag*, iron and steel producer, is prospecting for iron ore beneath the sea bed near Nyhamm on the Baltic Islands of Aeland. Echo soundings and magnetic prospecting have located an ore field two kilometers south of Nyhamm harbor where sea depth varies from 60 to 120 meters. The ore field is two square kilometers in area, but depth and quality of the ore are not known.

SWEDEN — *A.B. Atomenergi* has found a uranium deposit at Billingen in southwestern Sweden. The company has not yet determined whether it is of commercial value. The *Kvarntorp* uranium mine is now producing 150 to 200 grams of uranium per ton of ore, or an average of approximately 0.02 percent.

GREECE—The Greek government has granted the *Greek Chemical Product & Fertilizer Company* a $2,500,000 loan for the *Larymna* nickel project. The firm will mine iron-nickel deposits and set up a ferro-nickel processing plant at the mine. The German firm of *Krupp* has provided machinery for the project, and mining operations will begin this fall. A daily production of 160 tons is anticipated at the mine.

HUNGARY—A new ore dressing plant is under construction near Sztalinvaros. Sintered pyrite and other low-grade ores are to be processed at the plant. This includes ores from the Rudabanya district, which will be raised from their present Fe content of 18 percent to 35 percent.

ENGLAND—A British company is testing a new electrolytic process for producing titanium metal. It differs from the Kroll-magnesium process and the recently announced *Imperial Chemical Industries* sodium method, but there is some doubt whether this new electrolytic method can be operated on a commercial scale.

SWEDEN—Iron ore exports during the first quarter of 1955 totaled 2,930,000 metric tons, compared with 2,608,000 tons in the same period last year. Imports of commercial iron and steel increased from 159,000 tons in the first three months of 1954 to 246,000 tons in the same quarter of 1955.

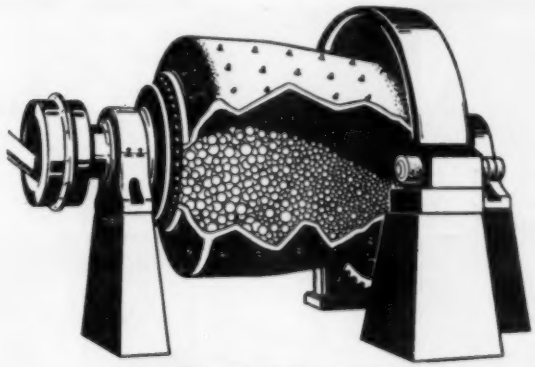
WEST GERMANY—*Deutsche Edelstahlwerke AG*, Krefeld, is the second German firm reported to have begun titanium production. The *Krupp* concern has also started producing the metal and exhibited titanium-made equipment at the recent Hanover chemical fair. (See MINING WORLD, Page 77, July 1955.)

WALES—*South Crofty, Ltd.*, Cambourne, is planning to expand mine capacity to 8,000 tons of tin ore per month. A shaft deepening program is planned, and a loan of £100,000 has been negotiated with *William Harvey & Company*, a tin smelting subsidiary of *Consolidated Tin Smelters*. The expansion program, which compares with 5,000 tons per month production in 1954, is designed to build up sufficient reserves to protect the company against price fluctuations in the tin market.

EAST GERMANY—Steel experts have called for a meeting with representatives of the West German steel industry to discuss possible iron and steel deliveries into the Eastern zone. A shortage has been noted, and in April East German steel prices doubled in a "readjustment" order.

NORWAY—A/S *Norsk Bergverk* is raising production at its *Soeve* columbium mines near Ulefoss to 200 tons of concentrate this year. Concentrates are being sent to *Norsk Hydro* A/S for upgrading.

ENGLAND—The *United Kingdom Atomic Energy Authority* has announced construction of a plant at Windscale, Cumberland, for processing the burnt "ash" from nuclear reactors. A new process for recovering unburnt uranium fuel from reactor "ash" at the atomic power station at Calder Hall is expected



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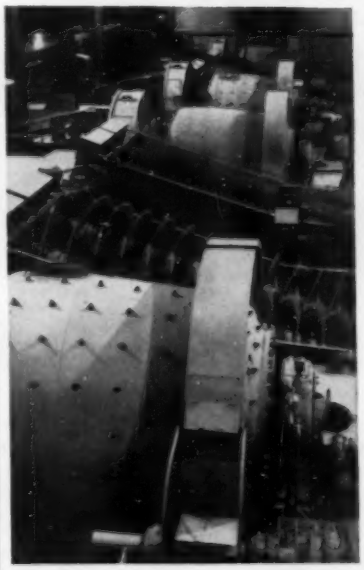

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B-126

to reduce fuel waste by nearly 10 percent. The Authority has also announced new dressing to concentrate uranium in the ore (in which 50 pounds of U_3O_8 is being found in every 100 tons mined) so that the bulk of the uranium will be contained in less than one-half ton of the dressed ore.

NORWAY—Dutch interests are reported to be interested in participating with the government of Norway in a tube rolling mill at *Mo i Rana*, northern Norway. A proposal to contribute 50 percent of cost of erection of the mill, which would be approximately £5,000,000, has been made. Mo i Rana's steel plant has an annual production capacity of about 170,000 tons, and the proposed tube rolling mill would require one-third of this.

BELGIUM—An additional 30,000 tons of pig iron will be imported from Russia. This will make a total of 100,000 tons imported from the Soviet Union since the beginning of the year.

AUSTRIA—Increases in the output of graphite have been noted. Production total during 1954 was 17,400 metric tons, 12,785 of which were exported. The export volume is still below the pre-World War II level, and Austria imported 179 metric tons of special qualities of graphite.

WEST GERMANY—The *Krupps* organization has concluded an agreement with the *Pakistan Industrial Development Corporation* to build a steel plant with an eventual annual capacity of 350,000 tons of crude steel. Construction of the Pakistan plant will begin this year.

MEXICO—All shares of the *Cia. Minera La Mojina* S.A. have been acquired by *Canamex Mining Corporation* of Vancouver, British Columbia, Canada, which will immediately install a 100-ton mill at the property, about 140 miles southwest of El Paso, Texas. Ore reserves in the mine reportedly total 200,000 tons, with grade of 9 to 10 percent lead, plus values in gold and silver. A new adit is being driven 100 feet below the previous lowest entry. A syndicate is lending the company an initial $160,000, with money to be repaid from earnings. C. W. Nash is president.

BRAZIL—The Export-Import Bank of Washington, D.C., will assist the *Cia. Vale do Rio Doce* of Brazil to the extent of $3,920,000 in financing the purchase of U.S. equipment for expansion of iron ore production at the *Itabira* mine. U.S. steel producers are heavy purchasers of this ore, and exports have been averaging about 1,500,000 tons in recent years. With the additional equipment, output is to be increased to 3,000,000 tons annually. Principal purchases will be Diesel electric locomotives, ore car components, and maintenance shop equipment for the company's 350-mile railway running from the mine to the port of Vitoria. Machinery for handling and screening ore at the port will also be bought.

CUBA—Indications of radioactivity have been recorded in the Isle of Pines, but extent of the deposits was not determined because of lack of precision equipment. Some radioactivity has also been found near the town of Sancti Spiritus on the island of Cuba itself, but no further investigation has been possible because of lack of equipment.

BRITISH GUIANA—Operations of *British Guiana Consolidated Goldfields Ltd.* on the Mahdia River have been suspended, and the Waddington dredge dismantled after expenses began to exceed revenue. Offsetting this is the construction work going on on the Konawaruk River where the firm is re-erecting the dredge purchased last year from the *Bulolo Gold Dredging Company*. All dredge parts had to be brought in by airlift after a landing strip was cleared out of the jungle. Prospecting operations are continuing and geological reconnaissance on the Ripununi River has shown gold indications over a distance of 20 miles along the river. The Potaro dredge continued to show a recovery in keeping with blocked out reserves, and the average recovery per cubic yard during the first four months of 1955 was 4.57 grains.

ARGENTINA—*Metalmina S.R.L.*, a subsidiary of *Compania Minera Alumine*, is reported to be operating a treatment plant for uranium and nickel, a few miles southeast of Buenos Aires near Quilmes. Daily capacity is said to be 20 tons of ore.

MEXICO—The Secretary of Finance, Antonio Carrillo Flores, has denied reports that the government will reduce mining taxes. He says that the mining taxes will be continued as is, but the industry will be aided by increased subsidies and more subsidies, which should

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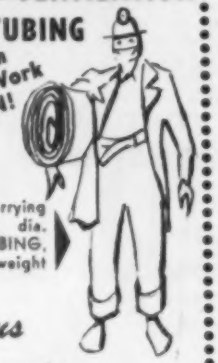

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be particularly helpful to small- and medium-scale operators. The Secretary explained that this is not the time to readjust mining taxes because of increasing prices for silver and several other metals and minerals which Mexico produces.

SURINAM—*Surinam Bauxite Company* expects its 1955 production to total about 2,370,000 tons, or roughly 15 percent below last year's figure which was a record high of 2,775,796 tons.

ARGENTINA—Argentina is reported to have purchased 2,000 tons of tin in Singapore. Some of this has already been shipped to Buenos Aires, and the remainder is reported to be on order.

BOLIVIA—*Mercantile Metal & Ore Corporation* of New York has won a settlement of $225,000 from the *Banco Minero de Bolivia* for services rendered in 1952. The firm maintained that it had negotiated for the Bank the sale of Bolivian tin concentrates to the *Reconstruction Finance Corporation* in the fall of 1952, following the suspension of RFC tin purchases when the tin mines were nationalized.

BRITISH GUIANA—The Geological Survey Department reports the discovery of a small quantity of diamonds in a hitherto unworked section of the Pakaraima Plateau. The department is heading a mining project to develop British Guiana's hinterland.

COLOMBIA—For the three-month period ended May 31, *Bulolo Gold Dredging Ltd.* reports 2,722,500 cubic yards dredged to recover 14,373 ounces of fine gold. Having worked out its reserves of payable gravel, Dredge No. 2 was permanently closed down on April 19. Dredges No. 4, 5, and 7 continue in operation, together with hydraulic mining on the *Widubosh* leases.

MEXICO—A shipment of 10,000 tons of sulphur, the largest single consignment of sulphur ever made in Mexico, was shipped by *Cia. Azufera Mexicana S.A.* from its operations near San Cristobal, Vera Cruz to West Germany. The sulphur was loaded on a British freighter at Coatzcoalcos on the Gulf of Mexico. It has been predicted that at least 1,000,000 tons of Mexican-mined sulphur would be exported this year.

BOLIVIA—The *Krupp* firm in Germany is reported to have submitted its report to the Bolivian government on possibilities of establishing tin smelting facilities in the country. Details have not been revealed, but the cost of erecting a smelter, and the technical problems involved in treating low-grade ore are believed to be serious drawbacks to the project. Meanwhile, Bolivia continues to ship a large part of its tin ores and concentrates to the Texas City smelter in the United States.

COLOMBIA—Underground development work continues in the *Silenco* mine of *Frontino Gold Mines Ltd.* in the province of Antioquia. Development work in 1954 was somewhat less than in 1953 but the percentage of vein payability increased from 23.3 percent to 26.2 percent. Active mining operations also continue in *Cristales*, and the Patio vein was encountered in the Cogote adit. The vertical shaft for the *Cecilia* prospect was sunk to the required depth for driving the first level.

MEXICO—Claims covering three beryl deposits were filed with the Ministry of National Economy recently. The

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claims are near San Luis Potosi City, capital of San Luis Potosi.

BOLIVIA—Exploration for bauxite is being conducted in the Sud Yungas region, and also in the Suri-Juntas region located on the border of the province of Beni.

MEXICO—Properties and equipment of *Cia. Minera de Pastitlan* S.A. are being offered for sale at public auction by the state government to raise funds for various payments for the workers. The base price is $70,000. The mining company suspended operations near Guanajuato City about 10 years ago, and since then the mine has been run by the employees intermittently.

BRAZIL—A placer deposit of gold has been discovered at Corrego da Lagoa in the district of Minas Gerais. The deposit was localized when a nugget of 8 grams was accidentally found, followed, a few days later, by the discovery of 15 more grams in the same place.

ARGENTINA—A recent report indicated the distribution of beryl in the country. Generally, the mineral concentration is small and very irregular. Cost of extraction is high and it is usually obtained as a byproduct of feldspar. The only exception is the *Las Tapias* mine in the province of Cordoba where the beryl occurs in ore bodies and pockets throughout a 5,000 square meter area. Total output since start of production is 3,000 tons. The other beryl deposits are generally scattered throughout the San Luis and Cordoba Sierre ranges in the provinces of Catamarca and La Rioja. Beryl mining in the country first started in 1932. The greater part of the ore mined goes to the United States. A plant in the province of Santa Fe produces beryllium oxide.

COSTA RICA—The manganese mine of *Manufacturers Steel Supply Company* in Costa Rica has been sold by the United States Bankruptcy Court for $2,000 to the high bidder, Warren L. Smith, president of *Warren Radio Company* in Toledo, Ohio. Manufacturers Steel began mining operations in Costa Rica in 1952. About 10,000 tons of manganese were mined but the firm was never able to process it to a point where it met the specifications of the *Union Carbide Company* of Baltimore which had contracted to purchase the ore. It was reported that the purchaser bought the mine for the other assets involved and would not attempt to operate it.

QUEBEC—*Mogul Mining Corporation* has taken over management and financing of *Eastern Smelting and Refining Company* and will continue with the *Chicoutimi* project, about 65 miles south of Quebec City. Mogul has agreed to supply all finances needed to complete the hydroelectric power project on the Chicoutimi River, and to complete the smelter for treatment of nickel and copper concentrate. It has already arranged contracts with *Quebec Nickel Corporation* and *Eastern Metals Corporation* to have their possible output of concentrates treated at this smelter-refinery. Mogul is

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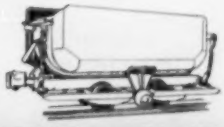

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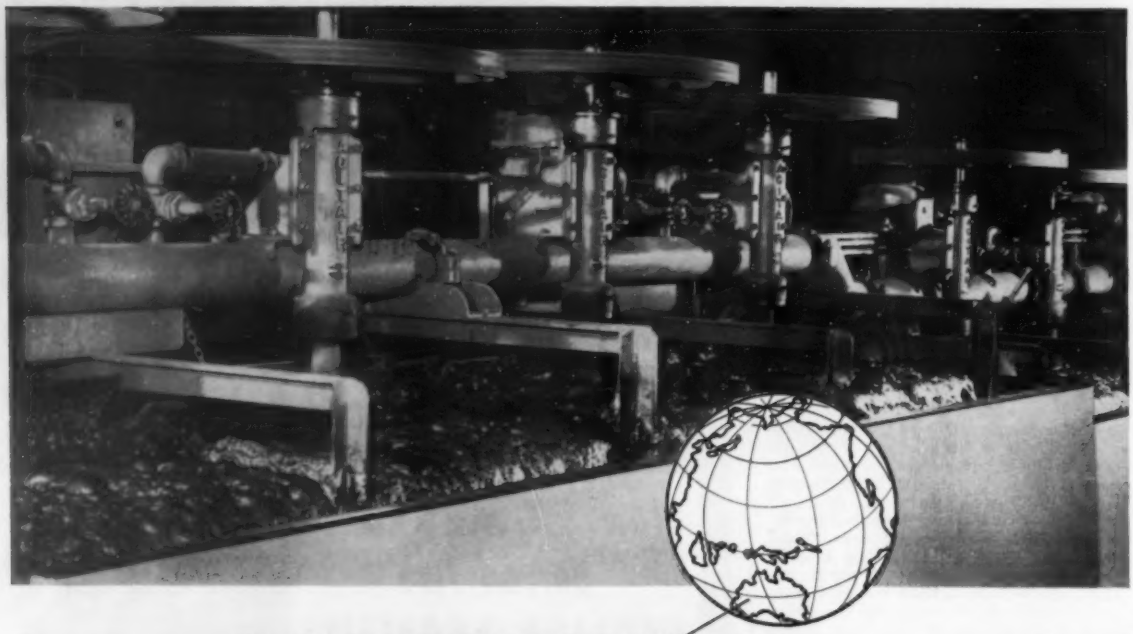

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also planning to put its *Harvey Hill* copper mine into production. Located about 35 miles south of Quebec City, the mine has about 770,000 tons averaging 1.9 percent Cu in two beds.

ALASKA—*DeCoursey-Brewis Minerals* has ordered a 30- to 40-ton Pacific Foundry Company furnace of special design to treat mercury ore from its *Red Devil* mine 250 miles west of Anchorage. In an attempt to solve special metallurgical problems created by the antimony present in the ore, oversized condensors and hoppers have been designed. The furnace will operate on Diesel fuel. It will be shipped from San Francisco this month.

BRITISH COLUMBIA—*Sheep Creek Gold Mines, Ltd.* is milling more than 500 tons of zinc-lead ore daily at its new *Mineral King* mine near Invermere, and is making a net operating profit of more than $50,000 monthly. This was achieved in slightly more than 12 months after mill tune-up. A new low level main haulage tunnel is planned 750 feet vertically below the present bottom No. 3 level. Recent work on that level opened ore for 250 feet with widths of from 18 to 52 feet.

SASKATCHEWAN — *Rix-Athabasca Uranium Mines* is undertaking a new program of exploration and development at its Beaverlodge area property. A 700-foot crosscut will be driven from the 250-foot level of the *Smitty* mine to provide drill stations for testing of an ore zone outlined by an adit and surface drill holes. This zone is an extension of the Smitty zone and will be probed below the second level.

QUEBEC—*Massberyl Company* has changed its name to *Massberyl Lithium Company, Ltd.* and has optioned an additional 1,200 acres of lithium-bearing properties in the LaCorne and LaMotte townships. Surface sampling and investigation of this property is now in progress, with drilling to be undertaken soon. The company also has an active exploration program underway at its 1,450-acre property in LaCorne township, slightly northeast of this newer acquisition.

ONTARIO—At its recent annual meeting, the Association of Canadian Testing Laboratories adopted a code of ethics designed to protect the customer and assure high quality work from member laboratories. The members exchanged ideas on testing techniques, brought their methods up-to-date, and discarded obsolete processes. J. White was elected president.

ALASKA—It has now been reported that the *Alaska Mining and Exploration Company* has taken over the DMEA contract of *Red Hawk Mines Alaska Inc.* at the *Riverside* lead-tungsten mine. This work had previously been planned by *Pacific Northern Minerals* of Spokane, Washington.

ONTARIO—Since completion of *Pronto Uranium Mines'* main shaft to a depth of about 600 feet, underground development has proceeded at a fast rate. Crosscutting has been advanced on the five levels, with work completed on the first, second, and third. Permanent headframe and ore bins have been completed, and permanent mine equipment installed underground. The mill and plant are to be in production in September. Surface diamond drilling is continuing to expand the ore reserves. During this current summer season, the company is also prospecting the southern portion of its west

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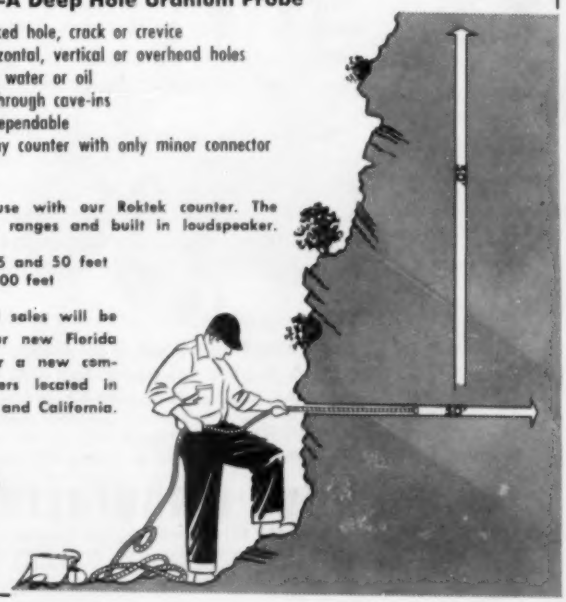

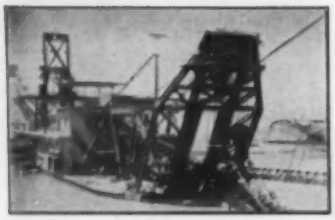

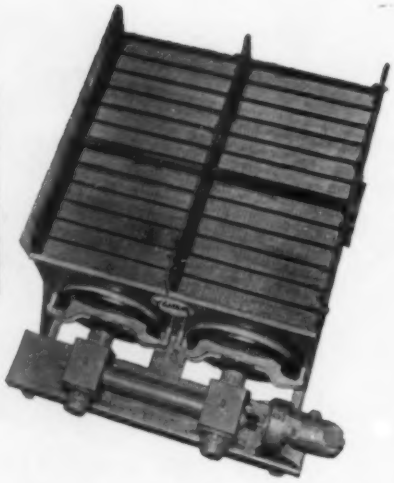

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YUBA jigs can be installed in new or old dredges or mills to supplement existing jigs or to replace other concentration methods. Send us data on ore, feed sizes and present installation if you wish us to furnish details to adapt YUBA jigs to your operation.

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and east group properties for base metal deposits of the Pater type, because the Pater fault zone traverses the Pronto properties.

NEW BRUNSWICK—*Keymet Mines Ltd.* expects to ship about 75,000 tons of lead and zinc concentrate to Belgium this summer for smelting. The mill has a capacity for handling approximately 200 tons a day.

NORTHWEST TERRITORIES—Higher prices for base metals, along with increasing possibilities for a railroad to Great Slave Lake, have led *Indian Mountain Metal Mines* to consider resumption of exploration work at its lead-silver-zinc property in Yellowknife. In previous drilling, 925,000 tons averaging 0.88 percent lead, 3.48 ounces silver, and 10.3 percent zinc were indicated above the 650-foot horizon, with an additional 500,000 considered possible between the 650- and 1,000-foot horizons.

ALASKA—*United States Smelting, Refining and Mining Company* is dismantling and moving its recently purchased Livengood dredge to the firm's property at "Hog" (Hogatza) River. It hopes to have the dredge in operation at its new location for the 1956 season.

BRITISH COLUMBIA — *Silver Hill Mines, Ltd.* has resumed work at its silver-lead-zinc property 20 miles east of Hope. A sub-level is being run under a No. 2 level ore shoot which yielded good values for a distance of 440 feet. E. L. Borup is president.

QUEBEC—*Lingside Copper Mining Company* has started diamond drilling of its 34-claim copper property east of *Opemiska Copper Mines'* property in the Chibougamau district. A contract for an initial 2,000 feet was granted to *Inspiration Mining and Development Company*. Magnetometer and electrical surveys earlier in the year outlined several anomalies.

ONTARIO—*Conwest Exploration Company* has staked 80 claims about 10 miles east of McKirdy where it has found considerable amounts of spodumene mineralization. Initial samples have run 1.5 percent lithia. The property is favorably located near railroad, highway, and lake transportation, and a few miles from a power line.

BRITISH COLUMBIA—A discovery of uranium- and lead-bearing ore has been reported adjacent to the southern transcontinental highway 12 miles east of Nelson at Kokanee. Stewart Maines, W. Roy Hunter, and Jack Boyce have staked claims covering the find. Near Slocan City, the *Jackson Basin Mining Company, Ltd.* has aquired 90 claims along a five mile structure. Both uranium and columbium have been reported. Fergusonite is one of the minerals identified.

QUEBEC—Milling of ore started at the *Gaspe Copper Mines Ltd.* property in April, despite the lack of expected hydroelectric power, and has been continuing at the rate of about 1,500 tons daily. The hydroelectric power was expected last October but was not received because of trouble with the submarine cables. Gaspe then provided sufficient power generating capacity to start operations at partial capacity, and full-scale production is expected when hydroelectric supply starts this summer. There was some difficulty with underground crushing and conveying because of excessively wet ore, and study is being made of the possibility of installing dewatering equip-

ment. Meanwhile, the tonnage rate is being increased to the limit imposed by the available power which appears to be about 2,500 tons per day.

ONTARIO—Officials of *Buckles Algoma Uranium Mines Ltd.* are now studying several production proposals for the *Algoma* property. The one receiving most attention calls for the erection of a 300- to 500-ton-per-day acid leach plant. The total capital required to develop and equip the mine, and provide for an acid leach plant of 500 tons capacity is estimated at $3,800,000.

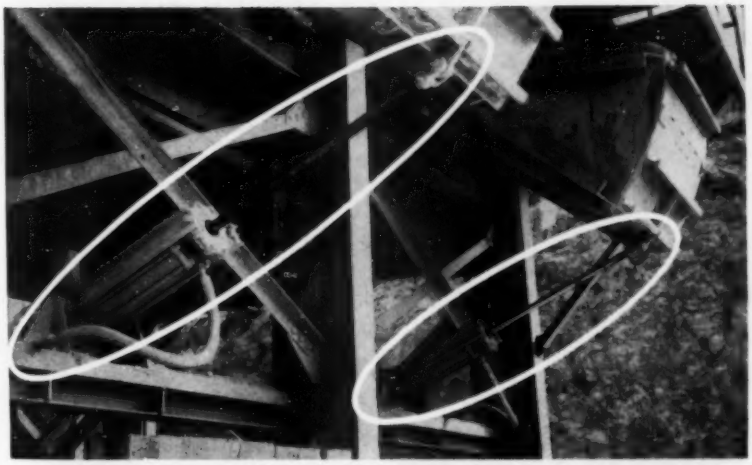
TANGANYIKA—*Geita Gold Mining Company Ltd.* has been granted a Special Exclusive Prospecting License, increasing the company's prospecting area by another 123 square miles. This provides the company with new virgin ground around the mine which will aid prospecting operations considerably. A recent report published on East Africa had suggested removal of legal and financial obstacles in order to encourage more mineral development in Tanganyika, and this seems to be an attempt along that line.

FEDERATION OF RHODESIA AND NYASALAND—*Messina (Transvaal) Development Company's* new *Umkondo* copper mine in the Fort Victoria area of Southern Rhodesia has been officially opened and is in production. Anticipated output is about 2,000 long tons of copper concentrate annually. As of June 1, the address of the head offices of all companies in the *Rhodesian Selection Trust Group* is Hardwicke House, Jameson Avenue, Salisbury, Southern Rhodesia.

UNION OF SOUTH AFRICA—The *Merriespruit Orange Free State Gold Mining Company* reports satisfactory progress in the erection of its reduction plant. It will have an initial capacity of 75,000 tons a month, and is expected to start trial milling in January 1956. The flotation plant to be built will produce uranium and pyrite concentrates which will be pumped to the Virginia plants for treatment. Sinking of the No. 1 shaft has been permanently suspended at 3,779 feet, and the ore body at greater depth will be opened up and developed from incline haulages or winzes sunk from this shaft.

NIGERIA—*Amari Mines Ltd.* has undertaken an intensive prospecting program to follow up on recent important discoveries of tantalite and columbite, which were made on two of the company's properties. The firm hopes to prove workable tonnages so as to relieve it from its dependence on a fluctuating tin price.

FEDERATION OF RHODESIA AND NYASALAND—*Rhodesia Broken Hill Development Company Ltd.* (Northern Rhodesia) has located an ore body, presently designated as the "X" ore body, in diamond drilling between the No. 1 shaft and the No. 1 ore body. It appears to be irregular in outline and of limited extent. A winze is being sunk to 950 feet so that the boundaries of the ore body can be determined by development.



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Although some pillars in the No. 1 ore body have been successfully mined by top slicing, this method is slow and costly. Experiment has shown that pillars can be economically mined by long-hole drilling from sub levels and it has therefore been decided to introduce this system. It will first be necessary to withdraw waste and ore fill in stopes adjoining the pillars and this work is already in progress. As far as the company's activities at Chowa are concerned, where manganese ore is mined, diamond drilling has shown that little ore of economic grade and width remains, and operations there will be halted. During last year's dry season, a total of 8,472 tons of manganese were mined, most of which was stockpiled for future use.

UNION OF SOUTH AFRICA—The newly formed *Saaiplaas Gold Mining Company* will develop a lease area immediately north of the *Harmony* and *Virginia* gold mines. About 4,920 claims are involved in the area which is in the Sand River sector of the Free State goldfield. An analysis of the drilling results of 18 boreholes in or near the lease area disclosed that the Basal Reef persists over nearly all of the claim area.

SWAZILAND—An inquiry is to be conducted soon into the mining laws of the territory in order to stimulate further the mounting interest in the potential mineral wealth. Over the past few years, South African, United States, and Canadian mining companies have focused increasing attention on the area's mining possibilities, which so far have been mainly dependent on asbestos production.

SIERRA LEONE—The Minister of Lands, Mines, and Labor has announced that a Sierra Leone delegation will discuss with the Secretary of State the issuance of licenses to African natives so that mining may be carried on by individual Africans in specified areas. Until now, the *Sierra Leone Selection Trust, Ltd.* has held exclusive diamond mining rights in the country.

SOUTH WEST AFRICA—Intensive prospecting operations during the last few years have increased the proved diamond reserves considerably. In line with this, the *Consolidated Company of South West Africa* has made the required additions to its treatment plants and is now able to increase its monthly output (working average grade of the deposits) from 57,000 carats to 70,000 carats per month. This latter figure should be attained by the end of the current year.

GOLD COAST — *Bremang Gold Dredging Company Ltd.* announces that its No. 1 dredge reconstruction is completed, and that dredging operations have started on the Extended Areas (Offin River). *Ariston Gold Mines* (1929) *Ltd.'s* new Central Shaft hoist is operating satisfactorily.

UNION OF SOUTH AFRICA—*Virginia Orange Free State Gold Mining Company Ltd.* expects to commission its uranium plant during this third quarter. The plant includes a pyrite flotation recovery section.

SOUTH WEST AFRICA—*Consolidated Diamond Mines of S.W.A. Ltd.* last year handled in all 10,460,858 cubic meters or 18,306,502 tons in stripping, mining, and prospecting operations with an over-all yield equivalent to 2.98 carats per 100 loads, compared with 3.3 in 1953. Of the total handled, 1,690,105 cubic meters were mined and screened gravels,

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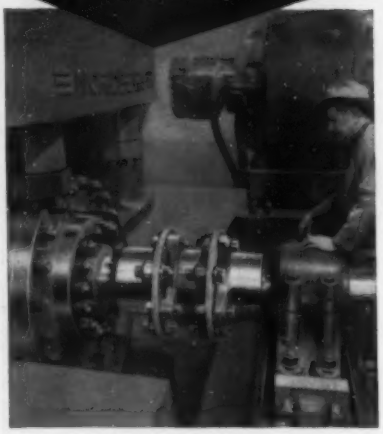

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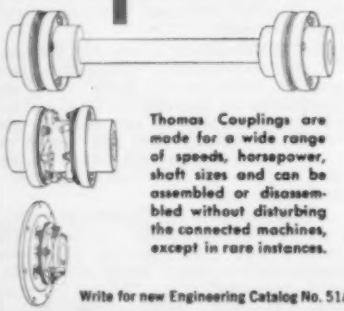

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compared with 1,067,284 in 1953. Mining and prospecting yielded 683,536 carats, compared with 590,534 in 1953. The policy of mining to a lower grade was continued. Prospecting added 3,000,000 carats to the reserves in 1954. Two new high-capacity screening plants were commissioned last year; one similar plant will be completed this year and several existing plants modernized. All gravels are now being milled before treatment in the heavy media plant. The grease belt section functioned satisfactorily, and the new electrostatic plant, commissioned towards the year-end, yielded most encouraging initial results. Prospecting operations in 1955 will be substantially extended above the 1954 level of 22,010 meters of trenching.

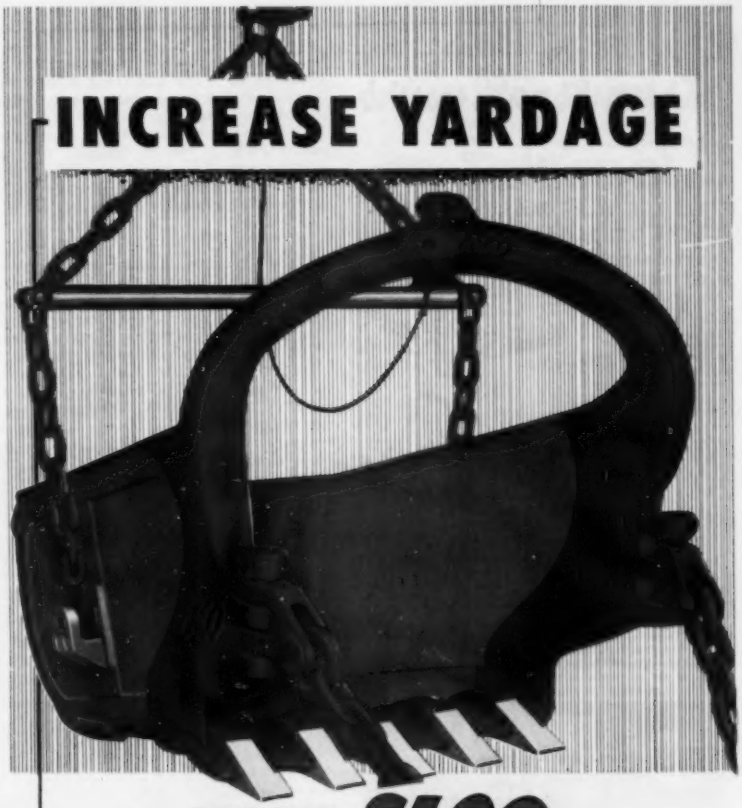
SOUTH AUSTRALIA—*International Nickel Company of Canada* reportedly will finance early exploration and development of a nickel-bearing deposit at Mount Davies. A special two-year mining lease has been issued to *South-West Mining Ltd.* which has been formed by *Nickel Mines of Australia, Ltd.* in association with "other interests." The area for investigation is large, extending into Western Australia.

REPUBLIC OF THE PHILIPPINES—Additional mineral deposits have been discovered in the region of the rich *Bongbongan* copper and pyrite mines now being operated by the *Luzon Stevedoring Company.* It is reported that discoveries have included molybdenum, manganese, chromite, pyrite, copper, silver, asbestos, lead, iron, and coal.

QUEENSLAND—*Mining Corporation (Aust.) N.L.,* recently formed in Melbourne, Victoria, will drill its cobalt areas at Mount Cobalt near Mount Isa. A series of cobalt, lead-zinc, and uranium leases have been acquired from *Metal Explorations N.L.* H. J. C. Connolly, consulting geologist, states that primary cobaltite at the bottom of the shaft of the *Mt. Cobalt* mine (about 230 feet) can be taken at 160 tons per vertical foot of 3.0 percent cobalt or £1,500,000 per 100 feet depth at today's prices.

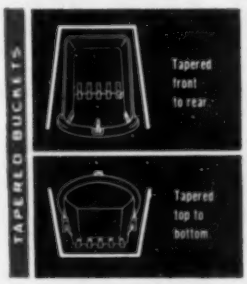
REPUBLIC OF THE PHILIPPINES—*Benguet Consolidated Mining Company* (operator) has about finished its major construction program at the *Coti* refractory chrome mine of *Consolidated Mines Inc.* This is one of the world's largest refractory chrome mines and can produce 2,000 tons of 32 percent chrome with 4.5 percent SiO_2 daily. About 45 percent of tonnage is hand-sorted lump ore and the rest HMS sink product. The company's mill has two Akins spiral separatory units, one 48-inch and the other 54. Separation density is 3.10. The company's 20.5 kilometer narrow gauge railroad was completed in mid-May, and enlargement of the port storage area is underway so that 50,000 tons can be stockpiled awaiting ships. The United States government has been the largest purchaser of this ore for its stockpile. E. J. Lavino and Company is another large buyer.

TASMANIA—Exploration and development of lower levels of the mine of *Aberfoyle Tin N.L.* at Rossarden is said



with NEW ESCO

TAPERED DRAGLINE BUCKETS



DIG FASTER—Bucket tapers from very wide front opening to proportionally smaller rear area so a greater portion of the load is carried in the front of the bucket—fewer drag lengths are required to fill. Wide throat, high tubular arch and small lip permits unrestricted flow of material—less line pull is needed.

DUMP CLEANER - FASTER—Taper from front to rear and from bottom to top allows load to drop free of the bucket. Height of box-sectioned tubular arch is equal to the width of the bucket at the hitches—load dumps clear of arch.

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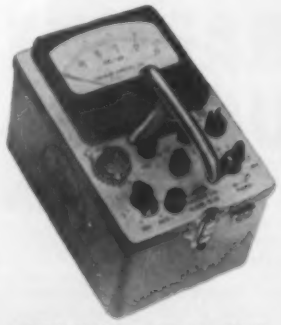

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to be disappointingly in low-grade ore. Reserves of what has been a very consistent profit-earned point to a present life of only four years.

INDONESIA—Diamond production per month in South Borneo is about 4,800 carats. The local government plans to mechanize mining operations which, until now, have been exclusively by hand and shovel.

REPUBLIC OF THE PHILIPPINES—Chikao Nishiwaki, chief of the mining and geologic departments of *Mitsui Mining and Smelting Company* of Tokyo, Japan, is heading a party of technicians currently exploring the Sipalay Copper Mining Company's property on Negros Island. This is the same deposit that *Kennecott Copper Company* prospected in 1947. About 10,000,000 tons of open-pit copper averaging about 1.0 percent copper with some silver, gold, and molybdenum is indicated. This is the *Binulig* deposit, and other prospects are to the northwest at Alberto and Baclao. Very preliminary consideration is being given to a 3,000-ton-per-day open-pit mine, flotation mill, Diesel electric plant, and harbor facilities. The Sipalay company is 60 percent Philippine (Elizalde Company) owned and 40 percent Japanese (32 by Mitsui and 8 by Nanyo Bussan K.K.).

WESTERN AUSTRALIA—*Hill 50 Gold Mines N.L.* at Mount Magnet has raised its estimate of ore reserves to 550,000 tons above the 820-foot level. Returns over four-week periods recently were running 8,979 tons for 6,310 ounces of gold. At Southern Cross, *Great Western Consolidated N.L.* treated 33,792 tons in May for a recovery of 5,064 ounces of gold, an increase of nearly 400 ounces over the previous month. Recent development in the *Copperhead* mine on the No. 14 level disclosed 9.7 dwt. over a width of 27.5 feet, and 5.7 dwt. over 30 feet. In the *Frasers* mine, two drill holes in the footwall of No. 4 level, south drive, averaged 11.5 dwt. over 13 inches, and 67.1 dwt. over 70 inches.

INDONESIA—The government has hired two Canadian geologists to explore the area around Kulon Progo for manganese. They will determine whether development work would be profitable.

REPUBLIC OF THE PHILIPPINES The Supreme Court has decided in favor of the *Minlawi Mining Association* in the recent controversy over a group of claims in Angaki, Ilocos Sur. The claims are reputed to include a rich copper deposit. Sources close to the Association report that immediate operations for exploration and development of the claims are being prepared. It was also reported that *Lepanto Consolidated Mining Company* would develop and operate the property under a subsidiary to be known as the *Angaki Trust*.

NORTHERN TERRITORY—*Uranium Mines N.L.* and *Northern Uranium Development N.L.* have made a joint statement regarding the companies' South Alligator River uranium areas. A substantial step has already been made toward finding sufficient ore to justify erection of a treatment plant. The El Sharana area is claimed to be the best surface prospect yet discovered in Australia. Sampling by trenching has indicated 1.47 percent U_3O_8 over a width of 24 feet and length of 120 feet. The average assay of well-defined siliceous material in the center of the lode is 2.09 percent over a width of 12.5 feet along the center of the entire lode length. At the widest point, the lode is 2.53 percent over a width of 46 feet. The western end of the outcrop disappears beneath younger rocks and it is hoped that the ore shoot extends in this direction. Deep drilling has started. A mile west of El Sharana, airborne scintillometer has defined an outcrop of shale 800 feet by 300 feet. Surface samples indicate values between 0.04 percent and 0.11 percent. At Saddle Ridge, four miles east of El Sharana, there is a 25,000 square foot outcrop with radioactive indications. Trench samples in torbernite indicate values from 0.05 percent to 0.18 percent.

REPUBLIC OF THE PHILIPPINES—*Philippine Iron Mines* produced 110,916 net metric tons of iron ore for shipment to Japan during the month of May 1955. This is 4,000 tons more than a previous record set in July 1954. *Lepanto Consolidated Mining Company* produced during May 5,417 tons of concentrate, estimated to contain 2,332,940 pounds of copper and 4,398.5 ounces of gold.

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MINING WORLD

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INDONESIA—Radio Makasar reports sulphur in the Minahasa (North Celebes) of a better quality than that of Soputan, also in the Minahasa. Ir Laoh of the Biro Karpi, an Indonesian engineering bureau, is investigating the deposits.

NORTHERN TERRITORY — *Peko (Tennant Creek) G.M.N.L.* is now sending copper concentrates to the *Electrolytic Refining and Smelting Company Ltd.* at Port Kembla, New South Wales. Concentrates were previously shipped to Japan but several shipments fired en route. Current output is approaching the planned figure of 200 tons per week, assaying over 20 percent copper. A very long haul is involved in shipment of the material from Tennant Creek to Port Kembla. Peko has reported cutting a lead-zinc lode in the lower levels of its mine. First indications are that this is not of economic value but anything may happen in this small but surprisingly rich and variable area. The mine started as a gold producer and, although some gold is present in the copper concentrates, copper is the principal economic metal today.

REPUBLIC OF THE PHILIPPINES —The *Paracale Gumaus Mining Company* has rehabilitated its prewar property near Paracale, Camarines Norte, and is now milling around 200 tons of ore per day.

SOUTH AUSTRALIA—Refined lead produced by the *Broken Hill Associated Smelters Pty. Ltd.* at Port Pirie amounted to 200,951 tons in 1954. The company's new up-draught sintering plant is now operating successfully and the contact sulphuric acid plant, completed in 1953, will utilize gas from this instead of imported elemental sulphur. Exports of refined lead were 159,328 tons.

INDONESIA—Mineral exports during January and February 1955 were as follows: manganese 4,770 tons and 2,087 tons; tin ore 3,750 tons and 3,022 tons.

NEW ZEALAND—The Minister of Customs, Dean Eyre, has announced the suspension of all duty on certain types of steel from foreign sources. This decision was taken after consultation with the United Kingdom government because of present difficulties in obtaining certain kinds of steel from British sources. The suspension is not applicable to some of the heavier types of steel, nor to tin plate or ferrous wire.

INDONESIA—The *Namurailangit* sulphur company in Tapanuli, northern Sumatra, expects to start producing 10 tons of sulphur daily within a short time. Japanese engineers are reported to be building the smelter, while a German engineer will lead the operations.

NEW SOUTH WALES—*Rye Park Scheelite N.L.* near Boorowa did little mining during the past year, but has had research work on its ore undertaken in the United States. The company recently stated that negotiations are underway with a U.S. tungsten consumer with a view to installing a treatment plant. The company's subsidiary, *Uranium Corporation of Australia*, has taken options over portions of the Maranboy tin field in the Northern Territory.

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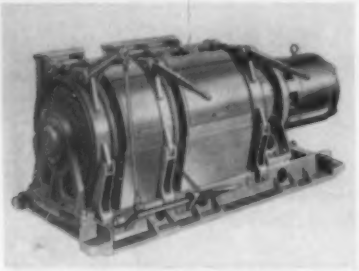

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U.S.A. Metal & Mineral Prices

METALS

July 15, 1955

COPPER:	**Electrolytic.** Delivered F.o.b. cars, Valley basis	36.00¢
	Lake. Delivered, destinations, U.S.A.	36.00¢
	Foreign Copper. Valley basis	36.00¢
LEAD:	**Common Grade.** New York	15.00¢
ZINC:	**Tri-State Concentrates,** jig, flotation 80% lead, per ton	$187.50
	Prime Western; F.o.b. t. St. Louis	12.50¢
	Prime Western; Delivered, New York	13.00¢
	Tri-State Concentrate, 60% zinc, per ton	$76.00
ALUMINUM:	**Primary 30 Pound Ingots (99% plus).** F.o.b. shipping points	23.20¢
ANTIMONY:	**Lone Star Brand.** F.o.b. Laredo, in bulk	29.00¢
BISMUTH:	(In ton lots) price per pound	$2.25
CADMIUM	**Sticks and bars.** 1 to 5 ton lots (Price per pound)	$1.70
COBALT:	**97-99%,** keg of 550 pounds (Price per pound)	$2.60
COLUMBIUM:	**Powder** Nom., per pound	$119.25
LITHIUM:	98% (per pound)	$10.00-$13.00
MAGNESIUM:	**Ingots (99.8%)** F.o.b. Velasco, Texas, per pound	29.25¢
MERCURY:	**Flasks.** Small lots, New York	$273.00-$275.00
NICKEL:	**"F" Ingots (5 pounds).** F.o.b. refinery, Port Colbourne, Ontario	64.50¢
TIN:	**Grade A. Brands.** New York (Price per pound) Prompt delivery	95.375¢
TITANIUM:	**99.3%** + Grade "A" (Price per pound)	$3.50-$3.95
GOLD:	United States Treasury Price	$35.00 per ounce
SILVER:	**Newly mined domestic.** United States Treasury price	90.125¢ per ounce
	Foreign Handy Harman	90.25¢
PLATINUM:	**Per Ounce**	$76.00-$79.00
ZIRCONIUM:	**Sponge, Per Pound**	$10.00

ORES AND CONCENTRATES

BERYLLIUM ORE:	**10 to 12% BeO.** F.o.b. mine, Colorado	$47.00 per unit
	Small lot purchases at Custer, S. D., Spruce Pine, N. C., and Franklin, N. H. Visual inspection at $400.00 per short ton or by assaying at: 8.0 to 8.9% BeO, $40 per unit; 9.0 to 9.9%, $45; over 10.0%, $50.	
CHROME ORE:	F.o.b. railroad cars eastern seaports. Long tons dry weight.	
	African (Rhodesian). 48% Cr_2O_3. 3 to 1 Ratio	$44.00-$45.00
	African (Transvaal). 48% Cr_2O_3. No Ratio	$31.00-$32.00
	Turkish, 48% Cr_2O_3. 3 to 1 chrome-iron ratio	$48.00
	U. S. Government ore purchase depot Grants Pass, Oregon. Base price, lumpy ore, $115.00; fines and concentrates $110.00 for 48% Cr_2O_3 and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr_2O_3.	
COLUMBIUM-TANTALUM ORE:	At United States small lot beryl purchase depots, $3.40 per pound contained combined pentoxides in 10% ore. Includes 100% bonus. (Government stopped buying temporarily May 12)	
IRON ORE:	Lake Superior. Per gross ton Lower Lake Ports	
	Mesabi, Non Bessemer, 51.5% Fe. Second quarter	$10.10
	Mesabi, Bessemer, 51.5% Fe. Second quarter	$10.25
	Old Range Non Bessemer. Second quarter	$10.25
	Old Range Bessemer. Second quarter	$10.40
	Swedish, Atlantic Ports, 60 to 68% Fe. Contracts, Per Unit	22.00¢
MANGANESE ORE:	**Metallurgical grade.** 48 to 50% Mn. Long ton unit	$0.89-$0.91
	Metallurgical grade. 46 to 48% Mn. Long ton unit	$0.87-$0.89
	Metallurgical grade. 45 to 46% Mn. Long ton unit	$0.77-$0.82
	Chemical grade. 80% MnO_2. Per Ton	$70.00
	Domestic U. S. Government are purchasing depots: Deming, New Mexico; base price $2.30 per long dry ton unit of recoverable manganese less handling and treating costs. Butte, Montana; (black and pink ores) base price of $4.87 per long dry ton of 18% manganese ore. Phillipsburg, Montana base price of $6.43 per long ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) $2.30 per unit with premiums and penalties.	
MOLYBDENUM CONCENTRATE:	90% MoS_2 F.o.b. Climax, Colorado. Per pound of contained molybdenum, plus cost of containers	$1.05
TUNGSTEN CONCENTRATE:	**Domestic.** 60% WO_3 Per short ton unit	$63.00-$65.00
	Foreign. 65% WO_3 Per short ton unit (Scheelite)	$32.00
	Foreign. South American, Spanish, Portuguese	$30.00-$31.00
URANIUM ORE:	**Carnotite-Roscoelite.** F.o.b. purchase depot plus $0.06 per ton mile ($6.00 maximum), Grand Junction, Rifle, Durango, Naturita and Uravan, Colorado Salt Lake City, Marysvale, Thompsons, Moab, White Canyon, Green River, and Monticello, Utah. Shiprock, and Bluewater; New Mexico, Edgemont, S. Dakota, Riverton, Wyoming, and Cutter, Arizona. Base price for 0.10% ore is $1.50 per pound and up to $3.50 per pound of contained U_3O_8 plus $0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of $0.25 per pound for each in excess of 10 pounds. A $0.50 per pound development allowance paid on all ore purchases. At Shiprock all ores with more than 6% lime are penalized for excess lime.	
VANADIUM ORE:	**Carnotite-Roscoelite.** V_2O_5 in ratio of more than 10 parts to 1 part of U_3O_8 are generally acceptable at all AEC depots, but excess not paid for at Marysvale, Monticello, Shiprock, and Bluewater	Per Pound V_2O_5 $0.31

NON-METALLIC MINERALS

BENTONITE:	**Minus-200-mesh.** F.o.b. Wyoming points. Per ton in carload lots	$12.50
	Oil Well grade. Packed in 100 pound paper bags	$14.00
FLUORSPAR:	**Metallurgical grade.** 70% effective CaF_2 content per short ton F.o.b. Illinois-Kentucky mines	$28.00
	Mexican. 70% f.o.b. border	$22.00
	European, Atlantic Ports, 70%	$30.00
	Acid Grade. 97% CaF_2 F.o.b. Kentucky, Illinois, Colorado	$50.00
PERLITE:	**Crude:** F.o.b. mine per short ton	$3.00 to $5.00
	Plaster grades. Crushed and sized. F.o.b. plants	$7.00 to $9.00
SULPHUR:	Long ton, F.o.b. Hoskins Mound, Texas	$25.50
	Export	$30.50

LONDON METAL AND MINERAL PRICES

July 12, 1955

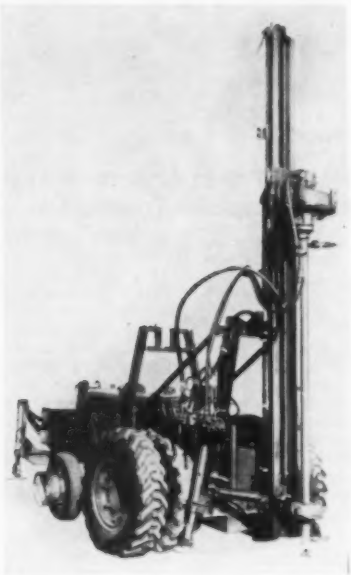
		Per Long Ton		USA Equivalent cents per pound[1]
COPPER:	**Electrolytic, spot**	£340	0s 0d	42.50¢
LEAD:	**Refined, 99.9%**	£104	5s 0d	13.03¢
ZINC:	**Virgin, 98%**	£ 91	10s 0d	11.44¢
ALUMINUM:	**Ingot, 99.5%**	£171	0s 0d	21.375¢
ANTIMONY:	**Regulus, 99.6%**	£222	10s 0d	27.81¢
TIN:	**Standard, 99.75%**	£730	0s 0d	91.25¢
TUNGSTEN:	**Long ton unit, 25½ equivalent to $35.14**			

1. With Sterling pound at $2.80.

Quotations on metals and certain ores through the courtesy of *American Metal Market*, New York, N. Y.

PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill or smelter. This PEP section is MINING WORLD'S way of making available to you some of the finest current information on mechanization.



New Low-Cost Rig for Rotary Rock Drilling

A new kind of portable drilling rig has been developed by Schramm, Inc., West Chester, Pa. The Schramm Rotadrill mounted on the Pneumatractor provides all the advantages of rotary rock drilling with compressed air. The unit is complete, self-contained, self-propelled, self-powered and boasts a low initial cost. One man operation is possible because all controls are arranged in one bank adjacent to the mast. It will drill a 4¾-inch hole to 500 feet. Special weight boxes and dual rear-wheels on the 125 cfm, heavy Pneumatractor provide 10,000 pounds down pressure. Bulletin PR-55 gives complete details. Circle No. 61.

Special Probes for Counter make 7 New Instruments

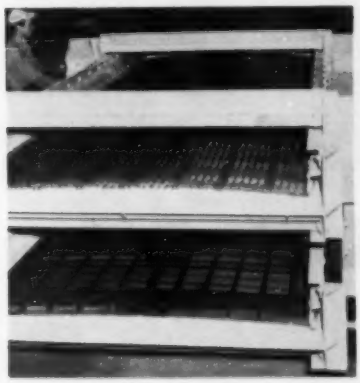
Nuclear Instruments Corp. of Los Angeles is now marketing a new 7-way counter. This instrument becomes any one of seven different counters by simply interchanging the proper probe or detecting device. Nuclear probes of different sensitivity may be purchased as accessory equipment which gives you the advantage of a new instrument without buying a second electronic circuit. Prices: basic geiger counter, $225.00; bismuth probe, $65.00; scintillator probe, $182.50; transistorized probe, $248.50; deep well probe (with 50-feet of cable), $110.00; ultra violet attachment, $75.00; aerial probe, $375.00. Circle No. 70.

New All-Purpose Sinker by Davey Compressor Co.

A new heavy-duty, minimum-weight rock drill has been announced by the Davey Compressor Co., Kent, Ohio. The Models DS-38 is said to actually be a 4-in-1 drill. With a few accessory parts, it can be quickly converted, without dismantling, from blower type to blast type, or to wet type with manual water valve or to wet type with auto-water valve. This makes the tool suitable for almost any drilling condition. Weight about 38 pounds. For additional information circle No. 69.

Rockover Skip Systems Hoist Open Pit Ore

National Iron Company's engineered Rockover Skip Systems, an inclined hoisting installation for open pit mines, provide fast, low-cost bulk movement of rock from the lowest pit-level to the surface. The installation, with double track skip runs, can be designed for inbalance hoisting. The surface structure remains stationary for the life of the operation; the skip-runs can easily be lengthened by adding track and moving the loading point to follow mining operations to deeper levels. The headframe can be just a simple unloading structure or it can be constructed to provide crushing, screening, feeding or concentrating equipment. Trucks gathering ore on upper benches work down grade in favor of the load to reach the skip loading station thus eliminating up-grade hauling. Capacity of skips may be specified; some have been designed to handle up to 30-ton loads. Circle No. 63.



Unique Vibrating Screen Has Revolutionary Design

The new "Hi-G" vibrating screen offers higher screening efficiency and operates on 50 to 75 percent less power than conventional vibrating screens according to the manufacturer, Hewitt-Robins Inc. These improvements are made possible by the use of a unique system of rubber and steel springs upon which the screen frames are mounted.

Controlled resonance induced by a relatively small mechanical exciter produces powerful vibrations with added "kick" to accurately separate materials according to size. All vibration is contained within a dynamically balanced system designed to greatly reduce energy losses, enabling operation with smaller and lighter drives and motors.

The screen will be made in various sizes from 4-foot by 10-foot to 6-foot by 28-foot. The main operating principles, as well as the many advantages offered by the "Hi-G" screen are fully described in an 8-page bulletin. Whether you are in the market for new screens now, or in the next few years, you'll want a copy of this informative bulletin. Circle No. 67.

Wave Impact Crusher is Unique Machine

The A. W. Fahrenwald Company of Spokane, Washington has developed a wave impact jaw crusher which is unique in action. The crushing stroke is progressive, since the swinging jaw approaches the fixed jaw progressively from mouth to throat. The manufacturer states that the advantages of this motion are: smoothness of performance; minimum stress on frame and bearings; heavy fly wheels are unnecessary and there is little or no compacting of rock in the crushing cavity at the finer sets. The machine has no toggles, employs permanently lubricated ball bearings and is driven by a 1 horsepower motor. The standard laboratory machine takes pieces 3¾ by 3¾-inches in size. For details circle No. 72.

Mobile Drill Ideal for Soft or Hard Formations

The new improved B-36 Mobile Drill, made by Mobile Drilling, Inc., Indianapolis, Ind., provides fast, inexpensive and versatile drilling. It can be obtained for either auger drilling or a combination of auger drilling and core drilling. Mounted on a Willys 4WD 1-ton truck, or similar unit, the cat head, sand reel and water pump with auxiliary transmission operates from the power-take-off of the vehicle. Telescoping tower raises to a working height of 17-feet. The B-36 is a one-man drill. Circle No. 64.

Lake Shore Opens Offices At Duluth, Buhl, Minnesota

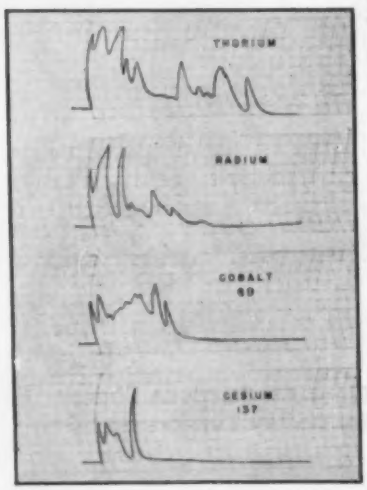
Lake Shore Engineering Company, Iron Mountain, Michigan, has opened district offices at Duluth and Buhl to expand its service in the iron range country.

It has taken over the following dealerships in the area: Dart trucks, Michigan tractor shovels, Marion bodies and hoists, American Brass, Bendix Westinghouse, Clark Transmission parts, Donaldson air cleaners, Diamond T, Federal, Heil, Kysor shutters and heaters, Lipe Rollway, Mak-Saf battery switches, Spicer, Wagner tachographs, Twin Disc torque converters, and Vickers.

Robert S. Shepard, formerly vice president of Myers Engineering Corp. and Myers Motors, Inc., will be Lake Shore's Minnesota district manager, with offices at Duluth.

Mobile Drill Scout Now Ready for Uranium Hunt

The Drill Scout, a mobile drilling rig made by Gustafson Manufacturing Co., Inc., Corpus Christi, Texas, can be hooked on the back of a jeep or a truck. It can be put in operation in about five minutes by one man, once on location, and has sufficient lifting capacity to enable it to bore to a depth of 200 feet. The Drill Scout is equipped with two water pumps and one hydraulic pump with a built-in relief valve. The kelly bar has a variable speed ranging from 250 to 500 revolutions per minute; maximum drop 9 feet per minute. The telescopic mast can be lowered from its full 9-foot 3-inch height to 6 feet above the bed. Kelly bar has a maximum 6 feet of travel. Price $1250. Circle No. 62.



Atom Smasher Applied to Mineral Exploration

The McCullough Tool Company of Los Angeles has developed a new neutron generator, scintillation spectrometer combination for elemental mineral exploration in a bore hole. The principle of operation is that high energy, deep penetrating neutrons are shot into rock formations from the generator which is lowered down the bore hole. The neutrons react with various atoms present in the formations which, according to the manufacturer, produce many products and reactions which are detected by the McCullough Scintillation Spectrometer. The heart of the scintillation spectrometer is the scintillation counter, which transposes nuclear energy to light. Ultimately the impulses are received as gamma ray, X-ray or neutron spectra. Circle No. 71.

New D7 Tractor Announced by Caterpillar Tractor Co.

The Caterpillar Tractor Company has announced a new D7 tractor which has many improvements that are primarily those that have been made to meet the need expressed by the user in the field. The new D7 has a 128 horsepower engine and it rated at a maximum drawbar pull of 28,700 pounds. Some of the other new features of this tractor are: redesigned engine block; new fuel injection system; a new starting engine; new radiator; larger fuel tank; new fuel filter system; redesigned oil filter base adapter; and improved air cleaner. For complete information on the new D7 circle No. 68.

Notes From The Manufacturers

WILLIAM F. BURROWS is the new general manager of the White Diesel Engine Division, White Motor Company, which will operate from Springfield, Ohio. The division was recently purchased from the National Supply Company and marks the Cleveland, Ohio firm's entrance into the Diesel engine industry. Mr. Burrows has been in charge of Diesel engine development for White Motor Company for several years. The company has been conducting a Diesel engine research and development program and intends to expand this work from its new Springfield base.

Robert F. Thurrell, Jr., Washington, D. C., is executive director of the newly formed International Resources Engineering and Exploration Group. Composed of Geophoto Services, Denver, Colorado; Jack Ammann Photogrammetric Engineers, San Antonio, Texas; and Brown & Blauvelt, New York City, IREX is not a merger but a pool of the related facilities of the three companies in all phases of natural resource studies. Offices are located in Washington, Denver, San Antonio, and New York City.

TRIPLE DUTY DRILL by Ingersoll Rand Co., embodies three separate and distinct drilling methods. It can operate as a rotary drill, as a heavy duty out-of-the-hole drill, or as a down the hole unit for 6-inch diameter holes. As a heavy duty hammer drill it will put down 4¼-inch holes. Circle No. 28.

TRUCK MOUNTED rotary blast hole drill made by Reich Bros. Manufacturing Co. exerts 20,000 pounds on the bit which is sufficient for holes of 7⅞-inches in diameter. Extra drill stems are mounted in a turntable for loading. For details circle No. 36.

BLASTING MACHINE: The Shotmaster blasting machine developed by Atlas Powder Company is a generator-powered, condenser-discharge type. The condensers can't fire at less than capacity indicated by the voltmeter and there are no batteries to replace. Circle No. 37.

OPTICAL REPEATING TRANSIT, offered by Wild Heerbrugg Instruments Inc., features internal optical reading for both circles, and a built-in optical plummet. Mining attachments include a 90° pentagonal objective prism for shaft plumbing. For information circle No. 38.

LEVEL INDICATOR: Robintronic bin level indicator uses an electronic signaling device to prevent accidental overfilling or emptying of storage bins. Developed by Hewitt-Robins, it has no moving parts to jam, rust, corrode, or lubricate. Circle No. 39.

DRY FLUID DRIVE: A new dry fluid drive handles difficult starting and reversing problems. Dodge Manufacturing Corp., says that flexidyne gives a new kind of protection against shock and overload on a variety of industrial drives. Circle No. 40.

DEEP HOLE LOGGING: Holes to 6,000 feet can be logged by the new Deep Drill Hole Scintilogger recently announced by The Radiac Company, Inc., New York. The Scintilogger is a portable, self-contained well logging system which includes a probe, cable, surface control box, and a graphic strip chart recorder synchronized to a footage counter. Circle No. 1.

HIGH TENSION BELTS for heavy duty conveyor use on long centers and high lift installations. Boston Woven Hose & Rubber Co. have developed two new high tension conveyor belts with synthetic fabrics which have working tensions up to 110 pounds-per-inch-per-ply. A four page folder gives complete details. Circle No. 2.

SHOVEL CABLES: Specially designed and constructed Securityflex cables offer non-kinking features, ozone-heat and moisture resistance and cushioned grounding wires for heavy duty mine power applications. Securityflex cable is described in a Shovel Cable Bulletin now available from Anaconda Wire & Cable Co. Circle No. 3.

INCREASING CRANE CAPACITY: Field Report No. 228 by Sauerman Bros., Inc. tells how to extend the reach of your crane and in many cases double its capacity with a Crescent scraper. Layout drawings and on the job photos support the case. For a copy circle No. 4.

CATERPILLAR D9, considered by many as the world's largest and most powerful tractor, is now described in a new booklet depicting the salient features. Pictures of the tractor, engine, and turbocharger plus brief specifications are included. Circle No. 5.

NEW IMPROVEMENTS on practically all makes of International crawlers are described in a booklet "What's New in International Crawler Tractors and Equipment." Extra space highlights the new International TD-24 torque converter diesel crawler just introduced in March. Circle No. 6.

MAGNETIC BRAKES and clutches made by Stearns Magnetic Inc. are described in a new bulletin. Detailed clutch and brake selection data including torque requirements, service factors and dimensions are outlined. For a copy circle No. 7.

BRAND NEW SCREEN made by Wedge Wire Corporation is being used in installations where it is necessary to clear long slivers of material from the feed product. The Marcel-Type Kleenslot Screen is entirely different, using a "curly" design for screen cloth construction. Circle No. 8.

DUETZ DIESEL ENGINES manufactured in Cologne, Germany by Klockner-Humboldt-Deutz are available in water cooled or air cooled models. Sizes on air cooled models range from 5 to 250 hp. and on the water cooled type from 3 to 2,000 hp. Circle No. 9 for literature.

JOINT COMPOUND: A new improved compound for sealing electrical joints has been developed by Aluminum Company of America. No. 2 electrical joint compound serves both as a sealing agent for electrical joints and as a solvent to remove the natural oxide films on aluminum conductor. Circle No. 10.

CRAWLER TRACKS: New design changes and improvements are said to double the life of ordinary crawler tracks according to Kensington Steel Co. The Kensington track has only three parts—the rail, the pin and the wear resistant manganese steel grouser. For complete details circle No. 11.

PERCENTOMETER, a new scintillation counter offered by Radiac Company, Inc., reads the uranium content directly. A permanent, accurate radioactivity record of an area can be made by simply attaching an Esterline-Angus strip chart recorder to the counter. Circle No. 12.

SLUSHER CATALOG: Vulcan Iron Works Company of Denver have published a new catalog, No. DB-5506, describing their electric slusher line ranging from 10 to 150 horsepower. Circle No. 13 for a copy.

RUGGED THEODOLITE: The Askania Mining Theodolite, Type Tkg-A, can be mounted on tripods, set-up bars or timber brackets. It is particularly advantageous for work in close quarters or raise surveys where steep sights are involved. A metal hood protects the instrument from water, dust and mechanical damage. Geo-Optic Co. of New York describes in a 12-page bulletin. Circle No. 14.

LIKE CHANGING A TIRE TUBE, that's how easily Maximix Rubber pump parts can be changed by your men with a minimum of down time. All Maximix parts, molded to shape, are locked into the designed position mechanically in Allen-Sherman-Hoff Pump Co.'s Centriseal pumps. Brochure No. 853 describing Centriseal pumps is available. Circle No. 15.

FRICTION DRIVE HOISTS: ASEA hoists, made in Sweden, offer many advantages to the mine operator. They can be automatically operated between any number of levels, will increase safety, and have lower power consumption. A fully illustrated bulletin describes the design features. Circle No. 16.

IF IT COULD ONLY COOK: The Schramm Heavy Pneumatractor will push, pull, power and provide air to drill, make roads, dig trenches, plow snow or do any other job around a mining operation. Catalog 5540 illustrates and describes. Circle No. 17.

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AIR AND WATER HOSE: If you use air and water hose, you'll want a copy of U. S. Rubber Co.'s catalogs 330 and 395. Complete specifications and recommended working pressures are given to help select the right hose for the job. Circle No. 18.

ELECTRIC WIRE AND CABLE: Users will be interested in General Electric's 24-page catalog entitled "General Electric Wire and Cable for the Mining Industry." Sizes, dimension weight, current rating, and other descriptions are given for portable cable, drill cord, locomotive cable, shot firing cord and other specialized mining types. Circle No. 19.

BETTER SCREENING ACTION: Allis-Chalmers new Aero-Vibe screen utilizes a simplified two-bearing design with counterweight wheels. Distribution of off-center weight increases bearing life. This and other details are high-lighted in a 12-page brochure, recently published. Also included are tables of capacities and formulas for figuring screen sizes required for your installation. Circle No. 20.

DEEP HIDDEN ORE BODIES containing uranium can be disclosed with Detectron Corporation's new DR-299 Nucliometer. The extra-sensitive instrument has four time constants and six operating ranges. Maker states that it is more sensitive than other counters using a 1½ by 1-inch crystal. Circle No. 21.

THICK-COAT KIT: The Pennsylvania Salt Mfg. Co. now has available a low cost trial kit of Thick-Coat, its new resin for humid and corrosive atmospheres. The new product provides a durable protective coating for new or corroded metal, concrete and wood surfaces exposed to fumes, corrosive atmospheres and spillage of destructive chemicals. For additional details circle No. 22.

NEW DRILL TOOL CATALOG: Now available from Vascoloy-Ramet Corporation is a new mining tool catalog which includes chain cutter bits, roof drill bits, finger bits, auger drill bits, rotary drill bits, percussion bits and carbide blanks for percussion bits. The catalog introduces a new style, DR-H3 roof bit, for extremely hard rock. Circle No. 23.

NEW INDUSTRIAL MIKE. Femco, Inc. has introduced a new microphone designed for use with communication and automation systems for industry. The new instrument is well suited to all applications where the level of ambient noise is a factor or where dust or moisture is prevalent. Circle No. 24.

PERCENT METER on Precision Radiation Instruments' new model 107C enables you to determine the approximate value of your uranium ore right in the field. A red flag indicator shows when the geiger counter is turned on, thus preventing unnecessary battery drain. The instrument sells for $149.50. Circle No. 25.

HYSTAMATIC DRIVE, a new and simplified torque converter-type drive is now offered on several models of the Hyster Lift Trucks. Hyster Company reports that the new drive design includes a clutch for precise speed regulation when combining the traveling and hoisting operation. Partial engaging of clutch allows a reduction of traveling speed while retaining fast lifting speeds. Circle No. 26.

HIGH SPEED DRILLS: Sprague & Henwood, Inc. announce the development of new diamond drills, Model 30 and Model L-2, to meet the demand for compact units which can be moved easily from one location to another and can also be relied upon to produce good cores up to moderate depths. Circle No. 27.

LIQUID CYCLONES will be marketed by Centrifugal & Mechanical Industries of St. Louis, Mo., under the trade name Clust-r-Clone. The Clust-r-Clones are grouped cyclones mounted on a compact single manifold which provides great savings in space requirements. A wide variety of units are available from the 20-inch cyclone down to groups of 4-inch units. Circle No. 29.

UNIT FLOTATION CELL: How the Denver "Sub-A Unit Flotation Cell recovers coarse mineral, lowers reagent costs, reduces losses in plant tailings, increases capacity of circuits and lowers power consumption is explained in Bulletin No. F12-B9 published recently by Denver Equipment Co. Flowsheets show various applications. For a copy circle No. 30.

ACCURATE GRID SURVEYS are possible with the first battery-operated, portable field geiger counter-scaler combination according to Fisher Research Laboratory. The unit records on a four digit scaler the actual number of geiger tube pulses over an automatically timed 30 or 60 second interval. Weight 10½ pounds. Price $465. Circle No. 31.

TREATED FILTER CLOTH, designated as type "M" treated cotton cloth, offers many of the advantages found in the synthetic fabrics at a cost close to that of untreated cloth reports National Filter Media Corp. The new cloth has been successful in operations on plate and frame presses and on rotary vacuum filters. For more information circle No. 32.

DIAMOND BIT CATALOG: Diamond Tool Research Co., Inc. of New York has issued a four-page catalog covering its complete line of diamond drill bits and reaming shells. A choice of three matrices enables you to select the one best suited to your drilling conditions. Diamond Tool, a prime importer of diamonds, also offers a rapid resetting service which is described in the catalog. For a copy circle No. 43.

3-WHEEL ROLLERS: A new 20-page bulletin on its standard and variable weight, three wheel roller line has been announced by Huber-Warco Co. of Marion, Ohio. Bulletin HWR-511 describes in detail the various units made by the company. Circle No. 35.

KING SIZE WASHING PLANT: Features, construction, performance and operation of the king-size Pioneer 405-W scrubbing, washing and sizing plant are all described in a new 8-page bulletin just issued by Pioneer Engineering Works, Inc. Cutaway drawings show advantages of this package plant. For a copy of bulletin No. 648, circle No. 41.

SUPER PORTABLE DRILL: A new diamond Core drill developed after more than 50 years of experience has been announced by Diamond Drill Contracting Co., Spokane, Washington. The rugged machine punches holes to a depth of 100 feet. Penetration rate is said to be comparable to a standard rig drilling EX holes. Weight of drill and transmission—35-pounds. Circle No. 44.

FADE-OUT TRACING PAPER: A Clearprint drawing and tracing paper with "disappearing" grid lines is now available in rolls from Clearprint Paper Co., Emeryville, Cal. This time-saving paper is printed with light-blue cross section rulings which completely disappear on direct print reproductions. Scale drawings can be easily and accurately made, and freehand lettering quickly applied. Circle No. 42.

NEW DEEP HOLE PROBE made by Powermite Drill and Tool Co. will follow a crooked hole to the end of the cable. It will work in overhead, horizontal or down holes. Circle No. 45.

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Idaho Mining Group To Meet at Sun Valley

The Idaho Mining Association will meet at Sun Valley, Idaho on September 8 and 9. A highlight of the meeting will be a discussion by the AEC's Idaho Operations Office of the industrial development to date of atomic energy. George O. Argall, Jr., editor of MINING WORLD, will also describe his recent trip through the Orient where he visited the most important mines and mills. He will show some of the many colored slides he took during that trip.

Northwest Prospecting and Development Company has started surface exploration of thorium-uranium found at the old *Golden Sceptre* gold-copper property on Hall Mountain, east of Porthill, northern Boundary County, Idaho. The firm was organized by the six Spokane discoverers, Carol, Charles, and Walter Greear, Verne T. Stapp, Clarence H. Sheldon, and Karl C. Fair. They leased the nine-claim Sceptre property and adjoining privately owned ground. They also located a number of mining claims on the mountain.

New Rainbow Mining Company, which recently made a direct smelter shipment of silver-lead-zinc-gold ore from the old *Weber* mine near Lakeview, Kootenai County, Idaho, is arranging to concentrate 700 tons of ore in a nearby flotation plant. An easterly drift in No. 4 tunnel is nearing the anticipated downward extension of ore being mined at the surface by *Austin-Meyer Corporation*. Robert B. Austin of Wallace is president and manager.

American Smelting and Refining Company is milling between 8,750 and 9,000 tons of silver-copper and silver-lead ore monthly from its new workings near sea-level in the old *Galena* mine west of Wallace, Shoshone County, Idaho. This was the planned rate when the mine went from a development stage to a mining stage early this year. J. E. Berg of Wallace is manager of ASARCO's northwestern mining department.

Lucky Friday Silver-Lead Mines Company of Wallace, Idaho, holed through its new three-compartment shaft-raise two weeks ahead of schedule. Work was started in February 1954, from 70 feet above the 1,800-foot level. Average daily advance was nearly six feet. The raise will be extended 127 feet above the adit level for sheave room. A rope raise, hoist room, ore pockets, and waste pockets also must be excavated before the new shaft can be put in operation.

Rustler Mining Company of Casper, Wyoming has purchased the *Hailey Trust* properties west of Hailey, Blaine County, Idaho, and is planning an extensive development program. DMEA aid is being sought to sink a 120-foot shaft an additional 150 feet. The Hattie vein structure, opened last fall from the shaft by *Hardee Exploration Company*, was 18 feet wide. Ten feet were in milling grade lead-silver ore; two feet were in high-grade lead-silver ore. Lenses of high-grade uranium ore were found up to 18 inches thick, mainly in the hanging wall side. Preliminary surface work last year by *Primitive Exploration and Finding Company* disclosed veinlets of uranium ore too small for commercial operation.

Salmon River Uranium Company planned to move machinery to the Florence-French Creek mining district of Idaho County, Idaho to test its holdings along the Salmon River. Philip Jungert of Lewiston is one of the owners.

Salmon River Uranium Development Company of Jerome, Idaho has been incorporated for $1,000,000 by William and Mary Wilcox of Jerome and Lawrence B. Quinn of Twin Falls.

Echo Bay Lead-Silver Mines, Inc. plans to resume development work at its lead-silver property near Bayview, Kootenai County, Idaho. Plans called for a ramp to the tunnel portal above the rocky shore of Pend Oreille Lake to facilitate handling of mining equipment and supplies; also 100 feet of tunneling. E. C. Schaeffer is president and manager.

Silver Star-Queens Mines, Inc., at last report was preparing to resume normal operations at its Blaine County, Idaho properties. Garfield Voget of Hubbard, Oregon has been named president, and Edward B. Riley of Aberdeen, Washington, vice president, to succeed N. T. Davis and Max Krueger, killed in an automobile accident in April.

William and Emma Schierding and Earl Wilson of Boise have incorporated *Urania and Strategic Minerals* of Boise, Idaho, a mining and prospecting firm, with capitalization of $500,000.

Lucky Lode Mining Company has been incorporated by James L. Brown, William Kennish, Geary Bierhaus, Oscar Hahn, Kenneth Austin, and Sam Ware, all of Palisades. Capitalization is $25,000.

Strong opposition from sportsmen caused *Lewis-Clark Uranium Company* at Kamiah, Idaho to abandon plans to dredge the St. Joe River from Simmons Creek to Hells Creek in Shoshone County. The firm withdrew its request for a state mineral lease and relinquished unpatented mining claims in the area.

Silver Banner Mining Company of Wallace, Idaho, a subsidiary of *Coronado Copper and Zinc Company* of Los Angeles, won a declaratory judgment in United States district court in Coeur d'Alene. *Trinity Trust*, headed by A.A.M. Arnold of Mullan, contended that the defendant had defaulted on a development and purchase contract covering the *Gold Creek* property near Mullan, Shoshone County.

Silver Star Mines has acquired the seven-claim patented *Ruth Consolidated Mining Company* property and the 11-claim patented *Silver Eagle* group adjacent to its own holdings north of Wallace.

Sidney Mining Company has completed a 600-foot shaft deepening project started last November at its zinc-lead mine near Kellogg, Shoshone County, Idaho. Following cutting of a 2,300-level station and pockets, cross-cutting was to get under way to the Sidney vein structure. Production by lessees and from company-operated stopes has been averaging about 3,000 tons monthly. M. C. Brown of Kellogg is president and Charles A. McKinley, general manager.

Conjecture Mines, Inc. has been organized by Donald Majer and Lyle Funnell of Spokane, Washington to carry on with a development program they started four years ago at the old *Conjecture* mine in the Lakeview district of Bonner County, Idaho. In deepening the mine from the 200-foot level to the 400-foot point, they found that the vein improved with depth. Nearly $30,000 worth of mill concentrates have been shipped to the Bunker Hill smelter at Kellogg. Values are in silver, lead, zinc, copper, and gold. Seven men now are deepening the shaft to open a 500 level. Mill expansion, including installation of a larger classifier, is planned to permit production of 75 tons daily. Mr. Majer is company president.

Charles Matthews of Kellogg, filed on three claims for uranium near Santa, southwestern Shoshone County. Idaho. Calvin W. Fordham of Ephrata, Washington recorded eight claims near the St. Maries-Calder Road in the same part of the county. Four claims were filed south of Clarkia by Walter C. Gray, Clifford A. Snowden, Jay W. Smith, Lowell M. Smith, oJhn Ledlow, Howard Eddy, Madge F. Eddy, and Ruby G. Smith.

First mining claim filing in 14 years at the Asotin County auditor's office was made by Stanley S. Jorgens. His claim is on the Wild Goose lode near Wild Goose rapids in the Snake River, a few miles south of Asotin, Idaho. Early-day mining activities in the county were mostly for placer gold along the river. Uranium hunters are becoming more and more active in the area.

International Metals of Idaho has been incorporated by John A. Carver Jr., Don J. McLenahan, and Helen Howell of Boise with capitalization of $1,000,000.

More than 400 claims have been filed by uranium hunters in Owyhee County, Idaho. Greatest concentration is around Reynolds and Squaw creeks in the northwest sector.

Great Western Engineering, Inc., a prospecting and mining company with headquarters at Lewiston, Idaho, has been incorporated by Joe H. Dillon and Sam J. Alexander of Lewiston; Elmo F. Wilcox and Gerald M. Cook of Spokane; Dr. Lloyd Berg, E. W. Schilling and Dale Atkinson of Bozeman, Montana; Ross A. Porter of Clarkston, Washington, and Clifton E. Dillon, Salt Lake City.

Idaho Uranium Corporation and *Wesco Uranium Corporation* have started drilling for uranium in Lemhi County, Idaho, about six miles south of Salmon.

The *Anaconda Company* is reported to be reopening the *Stewart* copper mine for deep level, vein, copper mining. Progress has been somewhat slow because of the shortage of man power during the strike.

Gold mining operations have been resumed by the *Master Mining Company* near Deer Lodge, Montana, after a bulldozer cleared away heavy snow. The season was late in opening because of

the late winter. O. L. Rhoades is president.

Minerals Engineering Company is currently expanding its Glen, Montana mill and tonnage throughout is expected to reach 25,000 tons this month. Exploratory drilling of the Ivanhoe ore body at Browns Lake has disclosed substantial increased tonnages of tungsten ore west of the existing open pit operations. Additional drilling is scheduled to further explore the extensions of the present ore body and to assess the potential in the adjacent claims to the west and north of Browns Lake. After milling large test lots of ore last fall from a *Birch Creek* property owned by the Stanfield brothers, the claims were acquired under lease and option in May. The property is within 15 miles of the Glen mill, and has a large undeveloped mineralized zone.

Montana Uranium Producers Association has been formed to encourage uranium prospecting in the state and to seek the establishment of uranium ore buying stations in Montana. Directors of the nonprofit group are T. V. Leonard, John R. Marchi, and John T. Vance, all of Helena; E. K. Cheadle and Paul Dawson, both of Billings.

Montana's state land board has drawn up a lease form for prospecting on state-owned lands. It provides for a $2.50 filing fee per application and a base rental of 50 cents an acre per year. A prospector will have two years to explore a state lease. The permit may be extended a third year if conditions warrant. The state would get 20 percent of any uranium money paid the prospector during this period. If a strike is made, an operating lease would be granted for a $500 fee. The state then would order a mineral survey to determine royalty to be asked from production. Files on uranium applications are closed to the public.

H. D. Moore of Florence, Montana; James C. Moore of Drummond, Montana; and H. L. Forkner of New York City, have incorporated *Brannerite Uranium Corporation.*

Homar H. and Luella R. Dundas and Edward F. Gates, all Missoula, Montana, have organized *Granite-Lodge Mines, Inc.*, with capital stock of $150,000.

Jack Mining Company has been incorporated by three Missoula, Montana residents, Jack Sheldon, George E. Minty and Mabel Bixby, with $100,000 capitalization.

Russell B. and Florence Luke, Rex F. Henningsen and Kenneth M. and Harriet J. Judd, all Butte, Montana, have incorporated *Russken Mining Company*, with capital stock of $50,000.

Mitchell Mining Company plans a modernization program at its *Marget Ann* mine two miles north of Butte, Montana. The program calls for a new headframe, a larger double drum hoist, a new skip pocket on the new 550-foot level, new ore bins, a shaft-to-mill conveyor, some new underground mining equipment, and mill additions for recovery of more manganese. The company has shipped more than $400,000 worth of gold, silver, lead, copper and zinc in the last four years. E. B. Olmstead is president. Company headquarters are at Mount Vernon, Washington.

Arnold C. Hanusa, John L. Dunckel, John Richem, Oscar Richem, and John Brophy have formed a mining copartnership called the *Drumlummon Lease Choteau* to operate at Marysville in Lewis and Clark County, Montana.

Carnotite of ore grade has been found in tertiary sedimentary rocks about three miles northeast of Winston, east of Helena, Montana. The carnotite occurs in tuffaceous shales, mainly coating fractures but in places partly replacing organic materials. Radioactivity has been found in four localities in the area. A leasing and staking rush was under way at last report.

OREGON

Great Lakes Carbon Corporation is test drilling extensive diatomite holdings in the Otis Basin district of Harney County, Oregon. R. McMillan is supervisor of the operation.

The *Evergreen Mining Company* suspended hydraulic operations on the North Fork of Galice Creek, in Josephine County, Oregon, with the opening of the fishing season and regulations of the Rogue River Coordination Board. More than 100 ounces of gold had been recovered by sluicing and by cleaning up with pans.

WASHINGTON

Dahl Uranium Mines, Inc. has been organized by Spokane, Washington men to develope a new autunite discovery west of Mount Spokane. The strike was made 1¼ miles northeast of the original *Dahl* farm discovery, by William D. Weaver of Spokane, using a scintillation counter. Two exposures were made 200 feet apart by digging through a few feet of top soil. The company is named after Leonard A. Dahl, owner of the 141-acre tract on which the strike was made. He also owns the land on which the original autunite discovery was made in the Mount Spokane sector. Incorporators of the firm are Mr. Weaver, G. C. LaDow, Harwood J. Tibbits, and R. Lowell Bell.

Goldfield Consolidated Mines Company of Reno, Nevada has filed on five mining claims adjacent to its *Blue Ridge* zinc-lead mine near Aladdin, northern Stevens County, Washington. The firm is operating a mill at the property on ore from the nearby *Deep Creek* mine. T. Higginbotham is resident manager.

Daybreak Uranium, Inc. has entered into an initial "off-the-Colorado-plateau" shipping contract with the U. S. Atomic Energy Commission for production from the Dahl lease in the western foothills of Mount Spokane, Spokane County, Washington. The AEC will buy 500 tons (10 railroad cars) as a starter. Good grade autunite ore has been found in two of four diamond drill holes put down by the AEC at last report. Channel sampling by the AEC over 35 feet in a surface bulldozer cut showed from 0.35 to 0.80 percent uranium oxide content. Channel samples taken over 20 feet in a second cut 200 feet west of the original averaged 0.50 percent uranium oxide.

Dawn Petroleum, Ltd. of Calgary, Alberta, Canada, has leased three tracts of land in the vicinity of the Daybreak uranium discovery, Spokane County, and transferred them to a newly formed Washington corporation—*Dawn Uranium and Oil Company.* An initial expenditure of $40,000 is planned for uranium exploration. Principal tract of 80 acres was leased from R. E. Wisemore of Spokane who, with Charles B. Wieber, found autunite in test holes dug to check high Geiger counter readings. Mr. Wieber is vice president of the new firm and Mr. Wisemore is a director. A. F. Gilchrist of Calgary is president of both firms. C. R. Echlin, who has moved to Spokane from Calgary, is vice president. Peter W. Mourer of Seattle is the firm's mining engineer.

Kit Carson Uranium, Inc. of Spokane, Washington, has been organized to develop promising showings of autunite on Kit Carson Mountain near Mount Spokane. The firm has leased about 600 acres of land. Geological work has been done and bulldozing was scheduled at last report. Principals in the firm are Ellsworth I. Connelly, Theodore Tester, Earl Carr, James Crump, and Virgil Veach, all of Spokane. Capitalization is $300,000.

Elk Uranium Company has found improved uranium values with depth at its *Harley B. Grimes* lease of 638 acres one mile west of the *Daybreak* uranium mine, Spokane County, Washington. The firm also has leased mineral rights on the 100-acre *Matt Ennis* property two miles northwest of the Daybreak and on the 95-acre *S. L. Liljegren* property near the Grimes lease. Mrs. Martha Diehm of Spokane is company president.

The Washington State Parks Commission at last report was continuing to reject applications to prospect for uranium on Mount Spokane state park land in northeastern Spokane County. The commission is studying the situation and watching a suit filed by three Spokane prospectors to force the state land commissioner to grant mineral prospecting leases on park lands on which his office retained the mineral rights. There are about 25,000 acres of park land involved. More than 130 applications have been made for 8,500 acres outside the main recreational area, which the commission had indicated it might lease.

Tungsten Uranium Mines, Inc. of Spokane, Washington, has leased mineral rights on 670 acres in the Dartford area, just north of the Spokane city limits. The land was acquired on the basis of scintillator readings. Bulldozer stripping was scheduled at last report. The land owners are Phillip Schaffer and C. C. Neumann. The company currently is stripping a radioactive area at its *Germania* tungsten mine in southwestern Stevens County Wellman Clark of Spokane is secretary-treasurer.

A Coeur d'Alene, Idaho prospector, E. V. Swank, has leased several hundred acres a few miles southeast of Spokane, Washington on the basis of what he called good scintillation counter readings. He also has leased 1,000 acres in the Moscow Mountains of Latah County, Idaho, and plans to diamond drill both areas.

Highnoon Uranium, Inc. has filed on four radioactive claims in the Addy mining district of Stevens County, Washing-

ton. Bulldozing is to be followed by diamond drilling. L. L. Felsman of Spokane filed the claims for the firm.

The *Edna* copper mine, seven miles west of Valley, Stevens County, Washington, is being unwatered. M. L. Carr, one of the owners, is directing work. Workings include a 370-foot shaft and 700 feet of laterals. High-grade copper values have been obtained from a 14-inch vein.

Four miles west of Kettle Falls, Ferry County, Washington, *Sunset Mines, Inc.*, has leased a uranium showing, bulldozed an access road, and done some stripping. A Seattle laboratory reported assays of 0.3 of 1 percent or 0.4 of 1 percent uranium oxide. Mining equipment has been trucked in from the firm's zinc-lead mine near Kellogg, Idaho, and Clyde Bellows, Seattle consulting geologist, is laying out a diamond drilling program. David Harvey of Seattle is company vice president.

As many as 300 cars were lined up along the Copper City road recently during a uranium rush to the Bumping Lake region 50 miles west of Yakima, Yakima County, Washington. Seventy-one persons filed claims in two days. The staking rush spread to the Chinook Pass area following reports of a "hot" find three miles east of the summit by Thomas Smith of Hainline. Tom Hendrix of Yakima filed the first claims in the Bumping Lake region. Prospectors poured in from as far distant as Seattle and Spokane.

Silver Dollar Mining Company, Spokane, Washington has acquired large acreage in the new Mount Spokane uranium district. Two crews were making radioactive surveys, at last report, preparatory to exploration work. The firm, with income from the Silver Belt of Idaho's Coeur d'Alene mining region, also is examining 3,000 acres of leased state land in Ferry and Stevens counties, northwest and north of Spokane County. Elmer E. Johnston, Spokane, is president.

Solar Corporation of Spokane, Washington has leased nearly 4,000 acres in Spokane and Stevens counties for uranium exploration. Fred E. Younker is president and Carl C. Schreiner, vice president. Howard W. Froman of Moses Lake is secretary-treasurer.

General Search, Inc. has been organized at Dayton, Columbia County, Washington, to develop radioactive showings in the Dayton area. Hubert Donohue is president and Dorsey Martin, vice president.

Athol A. Jones, Robert B. Kennison and Carl W. DeVier of Kennewick, Washington filed on two claims for uranium prospecting in the Kettle mining district, Stevens County.

Lead-Uranium, Inc., Spokane, Washington, has been incorporated for $50,000 by Oliver W. Harris of Metaline Falls, and Howard E. Harris of Ephrata.

C. J. and E. J. Mullen, Chewelah mining men, have filed on six claims in the Northport mining district of Stevens County, Washington.

Lucky Charm Uranium Mines, Inc. has been organized to hunt uranium on the Spokane Indian reservation in southwestern Stevens County, Washington. The incorporators, Alex Sherwood, his wife, Margaret, and a son, Robert, all of Wellpinit, have prospecting permits on five sections of tribal land in the reservation. Good radioactivity has been found on part of the ground.

Other recent locators of mining claims in Stevens County, Washington, were: Emory L. Miller and associates, Kirkland, Washington, in Deer Park mining district; Frank J. Lehrman and Joe E. Lehrman, Chewelah, in Chewelah mining district; Ray D. Brolliar, Donald H. Stolp and Hugh B. Stolp, all Chewelah, in Chewelah district; C. L. Dolson and C. W. Dolson of Colville, Colville mining district; J. A. Steele, Joe Brisbois and Ned C. Newbill, all of Fruitland, Springdale mining district; Dan S. Leuthy, Spokane, Deer Trail district; John D., Richard N., John V. and Michael P. Werner, Chewelah, in Chewelah district; Howard Franklin and Harold G. Little, Fruitland, Fruitland district; J. A. Steele and Tom Chance, Fruitland, Springdale mining district; D. R. Monette, Hunters, Hunters district; R. J. Palmer and Jess Alldredge, Chewelah, Acme mining district; Glen Reid and Frank Durgin, Spokane, Orient mining district; Ray Ewing and Don MacMillan, Hunters, Fruitland-Hunters district; Maynard E. Torgerson, Deer Park, and Ed Wynecoop, Wellpinit, Fruitland district; Berne W. Hackett, Dishman, and Donald E. Gibson, Spokane, Deer Trail district; Gordon LaVigne and Emery L. Tilton, Chewelah, south of Eagle mountain, Chewelah district; R. A. Sargent and Delmar L. Stratton, Colville, near Addy.

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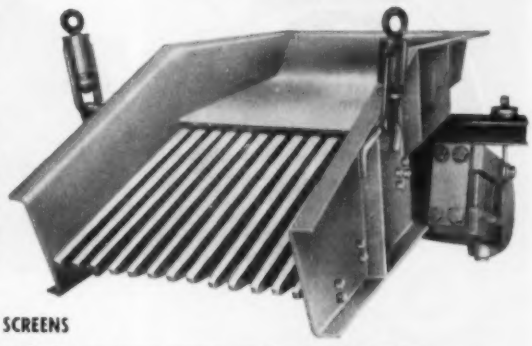

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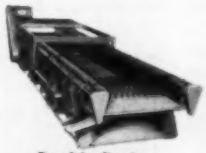

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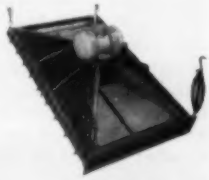

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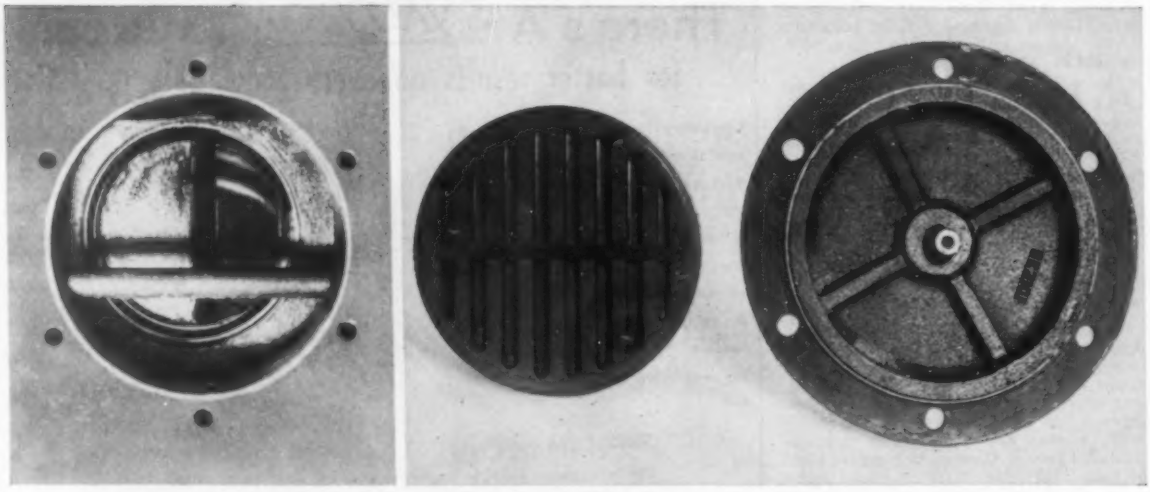

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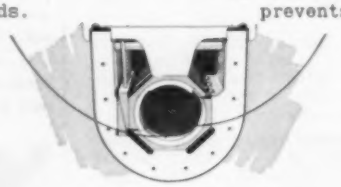

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Minerva Oil Company has started making shipments of zinc concentrate by barge instead of rail, representing a considerable saving for the company. The concentrate is loaded at Cave-in-Rock in Hardin County, Illinois, and shipped up the Ohio River to the *St. Joseph Lead Company's* smelter at Monaca, Pennsylvania, about 100 miles from Pittsburgh. At Minerva's No. 1 fluorspar mine, a new underground crushing station has been installed. A long pan feeder receives the ore from Diesel trucks. The crusher discharges onto a 30-inch-wide belt which carries the fluorspar to a shaft storage pile. The underground crusher has been responsible for savings on handling, has reduced wear on the belt, and takes part of the load off the primary surface crusher thereby increasing potential plant capacity.

The *Manidon Mining Company* of Mandan, North Dakota reports that it has made the largest uranium deposit discovery in the state. The deposit is located in southern Billings and northern Slope counties in the Amidon area. The firm has leased 7,000 acres from the Evangelical Lutheran Church of Minneapolis which owns the property.

The *Aluminum Company of America* has asked the Rosiclare, Illinois City Council for permission to prospect for fluorspar under the levee south of the company's plant at Rosiclare. Alcoa deeded the property to the city in 1950, retaining mineral and mining rights but promising to submit plans and specifications to the City and Corps of Engineers at Louisville, Kentucky for approval in order to assure safe maintenance of the levee. Alcoa proposes to drive a drift under the levee and specifies that a concrete bulkhead would be built in the drift on the inside of the levee.

Carolina Mines, Inc. of Kings Mountain, North Carolina has decided to proceed with mining of kyanite on its 261.5 acres of land in the Graigmont section of Gaston County. The company hopes to be in operation by the fall of this year, or by the first of next year at the latest. The company is currently considering erection of a concentration plant. A. S. McCulloch is president and treasurer; J. E. Herndon is vice president; J. R. Davis, secretary; J. B. Hamilton, assistant treasurer; and J. J. Mullinax, assistant secretary.

Development of the *Ore Knob* mining property by *Appalachian Sulphides Inc.* in Ashe County, North Carolina is well under way. Contracts have been let to *Cowan and Company* of Birmingham for the sinking of a 1,300-foot shaft and to *E. J. Longyear and Company* for diamond drilling. The first hole was started at *Durgy* mine, and the second at *High Hill* mine, both in the Virginia section of Virginia and North Carolina. Appalachian is a subsidiary of *Nipissing Mines Company Ltd.* of Toronto, Canada.

The *Union Carbide & Carbon Company* reportedly has a crew in the field sampling beach sands on Amelia Island near Fernandina, Florida in the northernmost part of the state.

United States Steel Corporation has applied to the Office of Defense Mobilization for a certificate of necessity covering iron ore sintering facilities at Houseville, Pennsylvania, near Pittsburgh. The ODM recently granted a certificate to *Columbia-Southern Chemical Corporation* at Natrium, West Virginia, for titanium tetrachloride for the production of titanium metal. The sum was $5,500,000 with 90 percent allowed for rapid tax write-off.

Rhude & Fryberger has reopened the *Pennington* mine on the Cuyuna Range. This mine was not operated previously this season because of difficulty in selling this particular quality of ore. The Pennington is expected to be exhausted of open-pit ore at the end of this season, although some underground ore is still available.

First ore has been shipped from the new *Tioga No. 2* mine operated by *Pickands Mather & Co.* for the *Western Mining Company*. The Tioga property, five miles southwest of Grand Rapids, is owned by the State of Minnesota and leased to Western Mining. Crude ore from the pit will run between 35 and 45 percent iron. After processing in the new beneficiation plant, the concentrate will be about 55 percent iron. A conveyor belt from the bottom of the open pit to the plant is nearing completion. Pickands Mather also commissioned two other new plants recently: the Danube, near Bovey, and the Bennett near Keewatin. The Bennett was the latest to go into operations. All three plants have heavy media separation sections and the Tioga and Bennett have HMS cyclones treating the fines.

Rhude & Fryberger is making an addition to the washing plant it is installing at the *Troy* mine near Evelth, Minnesota, which will represent a new type of concentration for washing plants on the Iron Range. The washing classifier overflow will be run through magnetic separators to recover an estimated 20 long tons per hour of magnetite in the minus-48-mesh size. All of the minus-1¼, plus-¼-inch ore will be run through a scrubber to remove slimes and sticky fines. The plant is expected to be in operation shortly.

The new HMS section of *Balkan Mining Company's* concentrator has been put into operation this season at the *Danube* mine, Bovey, Minnesota. *Pickands Mather & Co.* are the operating agents for Balkan. Washing, jigging, and HMS classification are now being done at the Danube.

International Minerals Buys Phosphate Plant

International Minerals & Chemical Corporation has purchased the Tennessee Valley Authority's Godwin phosphate plant at Columbia, Tennessee, shown above. Built by the Federal government in 1942, the plant sold for $635,000 in competitive bidding. Besides the plant and all equipment, International also acquires 406 acres and 1.7 miles of railroad siding. Rehabilitation is expected to cost about $750,000. When completed, it will enable the plant to process about 3,000 tons of ore per day from extensive reserves in the immediate vicinity. First units to be reactivated will be the mining and washing plants, followed by the drying and grinding units. First products to be produced will be wet phosphate rock for electric furnace trade, dried phosphate rock for acidulation in fertilizer processing, and finely ground phosphate rock for direct application to the soil. The Godwin plant's facilities for making fused tricalcium phosphate will be kept in a standby condition.

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ASARCO Opens Its Mill At Crested Butte, Colorado

American Smelting & Refining Company has opened its Keystone lead-zinc mill at Crested Butte, Colorado and expects to employ 100 men by the first of next year. The plant, built in 1953, never opened because of a drop in lead and zinc prices. Encouraged by current market prices, the company began hiring in May of this year and started operations in June.

The 200-ton-per-day differential flotation mill is located at the Keystone mine five miles northwest of Crested Butte in Gunnison County. Construction was under the direction of Western-Knapp Engineering Company of San Francisco, California.

Salt Lake City To Host AIME Minerals Conference

The second annual Rocky Mountain Minerals Conference will take place in Salt Lake City, Utah, October 6-8 under the auspices of the Utah Section, American Institute of Mining & Metallurgical Engineers. Sponsored last year by the Industrial Minerals Division, the program this year has been broadened to include the Mining and Metals branches.

Technical sessions include the following papers and addresses: "Uranium Occurrences West of the Colorado Plateau," Ernest E. Thurlow, manager, Salt Lake Exploration Branch, United States Atomic Energy Commission; "Control Engineering in Minerals Beneficiation," Carl M. Marquardt, Industrial Physics and Electronics Company; "Chemical Refining of Tungsten," Blair Burwell, Jr., Salt Lake Tungsten Company; "Rare Metals," M. H. Kline, vice president, Rare Metals Corporation of America; "Rod Mills and Ball Mills at the Hayden Plant of Kennecott Copper Corporation," Kennecott milling staff; "Underground Mining of Phosphates," D. L. King, general manager, San Francisco Chemical Company; "Uranium Mining Methods," J. Fred Johnson, consulting engineer.

A technical symposium on "Greater Cooperation among Geologists, Mining Engineers, and Metallurgists for Metallurgical Planning" will also be held.

General co-chairmen are Norman Weiss and R. C. Cole. Jack M. Ehrhorn is chairman of the Utah section and Neil Plummer is vice chairman.

Tours to various mining and metallurgical plants in the Salt Lake valley will be conducted during the conference.

Wet Mountain Mining, Inc., Canon City, Colorado, is negotiating with the *Lindsay Chemical Company* to buy five tons of 10 percent thorium concentrate per day from the company's holdings south of Canon City. Wet Mountain is planning to build a thorium concentrate mill on Tuttle Ranch, 17 miles south of Canon City. If present negotiations with *Associated Engineers, Inc.*, Denver, Colorado, are successful, this will be the first such mill on the Eastern Slope.

Uranium production from the Atkinson Mesa mine of *Golden Cycle Corporation*, Grand Junction, Colorado was 3,057 tons during the first five months of 1955. Production in May reached 868 tons. Since initial production in March of 1954, the company's uranium division has produced 6,903 tons of ore worth $231,955. The firm is now doing exploratory drilling on its *Monogram Mesa* property and is negotiating for purchase of additional uranium properties.

Beaver Mesa Uranium Corporation is the new firm formed by the merger of *Cherokee Utah Uranium Corporation*, Salt Lake City, Utah, and *Ventures, Inc.* of Grand Junction, Colorado. It will operate the former holdings of Cherokee Utah on Beaver Mesa in the Gateway mining district, as well as holdings of three other firms in the area under percentage agreements. A shaft and two drift mines are now in production on the properties. These include the Cherokee shaft on the *JWL Fraction No. 1*, the *Pack Rat* drift, and the *La Sal No. 4* drift. The Pack Rat group will be mined for *New Idria Mining & Chemical Company*, which recently purchased the claims from Don and Dorothy Danvers for $675,000. This transaction included the *Shakin Quakie Fraction* and *Jonnie Mae No. 1-5*, which will also be developed by Beaver Mesa Uranium. The firm will mine *La Sal No. 4* for *Flanders Mining Corporation*, and for *Gateway Mining Co.*, the *La Sal No. 1, Stockton Fraction*, and *La Sal No. 1 Extension*.

The *YSY Mining Company* of Texas has purchased 14 uranium claims on Hermosa Mountain, 14 miles north of Durango, Colorado. Sellers were Tom Aldridge, Durango broker; Morton Thompson; D. H. Byrd, Dallas, Texas; and Alvie Fielding, Durango. Ore on the property appears in an outcropping about 1,300 feet long and up to 5 feet deep. Extension into the mountain has not been determined. The deposits is in the Rico formation and reportedly contains uranophane and vanadium ore with occurrences of pitchblende.

American Gilsonite Company will spend more than $10,000,000 on expansion of its gilsonite mining operations at Bonanza, Utah to construct a refining plant in western Colorado, and to lay a connecting buried pipe line to supply the new plant. Construction will begin this fall with completion scheduled for late 1956. The company has conducted pilot plant operations at its *Bonanza* mines for three years. When the new refinery goes on stream, the hydrocarbon material will be mined by hydraulic methods, a new process for gilsonite operations.

Woodmont, Inc., subsidiary of *Continental Uranium, Inc.*, has started an extensive strip mining operation at its *Rattlesnake* mine near Moab, Utah. Continental engineers have been conducting a drilling and core analysis program on the property for the past six months. The contract for the stripping operation, which will cost $750,000, has been awarded to the *Daniels Construction Company*, Albuquerque, New Mexico. Completion date is set for March 1956. The project calls for moving 2,500,000 cubic yards of earth and rock from an area 600 feet by 450 feet with an average depth of 170 feet.

Hypotheek Mining & Milling Company, Wallace, Idaho, has acquired 50 percent interest in two additional properties in the Coyote Wash area, San Juan County, Utah. A 200-acre tract adjoining the firm's original 10 claims will be drilled for 50 percent of profits after royalty payments. A 119-claim group, held by *Uranium Mines, Inc.*, Wallace, also will be drilled for half of the profits after royalties. *National Silver-Lead Mining Company*, Wallace, will receive half of Hypotheek's share in this property for sharing costs.

Paramount Uranium Corporation, Moab, Utah, has begun opening up the rims on its *Pinch* group of claims on Hart's Rim, northwest of Monticello, Utah. Surface ore showings have been reported, and the property may be wagon-drilled after rim-stripping is completed. J. C. Burgess, field consultant for Paramount and president of *Atlas Uranium Corporation*, is in charge of development. Paramount is continuing to ship approximately 25 tons per week from its Montezuma Canyon mine.

Uranium Mines, Inc., Wallace, Idaho, has purchased a one-half interest in the 190-acre *Phoenix* property, Big Indian district, San Juan County, Utah. *Western Silver-Lead Corporation* and *Square Deal Mining & Milling Company*, also of Wallace, jointly own the remaining half interest. Drilling is underway. Uranium Mines also has acquired a one-fourth ownership in the 600-acre *Tucker Flat* group in the same district. *Uranium Holdings, Inc.*, Wallace, owns the remainder. One hole has indicated commercial ore, and additional drilling is planned.

The *Joint Committee on Atomic Energy* has approved a request by the *United States Atomic Energy Commission* for $1,550,000 for expansion of the Monticello, Utah uranium mill. The plant, operated for the AEC by the *Gallagher Company* of Salt Lake City, is already in the midst of an expansion program, and the authorization of funds was granted for any immediate further expansion needed. The committee also allotted $500,000 for purchase of a site at Monticello for vanadium tailings storage sites, including one at Monticello. This may mean that vanadium concentrate from the ores will be stockpiled at the mill instead of being converted to vanadium flake.

Hecla Mining Company, the operating firm at *Federal Uranium's Radon* property, Big Indian district, San Juan County, Utah, has completed its surface mining camp and started shaft work. The ore bed should be reached by early fall.

White Canyon Mining Company, Dove Creek, Colorado and Phoenix, Arizona, is shipping ore from its *Hideout*, *W N*, *B & I*, and *White Canyon No. 1* claims. Average U_3O_8 content of the ore is 0.30

percent, and approximately 100 tons per day are being sent to the *Atomic Energy Commission* buying station in White Canyon, Utah. No large-scale mining is being done at present, and the ore is produced in the process of exploratory drifting. F. A. Sitton is president of White Canyon.

Three mining firms from northern Idaho's Coeur d'Alene district are drilling on the 82-claim *Dead Horse* group 14 miles southwest of Moab, Utah. A tunnel is being run into the canyon wall to open the ore zone. Participating are *Bismark Mining Company*, *Merger Mines, Inc.*, and *Nabob Silver-Lead Company*. The firms are also developing the *Blanca* property in Uintah County. C. H. Hunter, Merger Mines president, is in charge of both operations.

A group of California businessmen has taken an option to buy 87 uranium claims from *Circle Cliffs Uranium Company*, Salt Lake City, Utah, in the Circle Cliffs area of Garfield County, Utah. The claims represent all of the firm's land assets and would be sold for $5,400,000. Under terms of the option Circle Cliffs will complete $70,000 worth of test drilling this month. Representing the California syndicate are Leo Higbee, Spokane, Washington, and Alden Higbee, Provo, Utah.

A high assay was reported from a sample of ore taken from the *Yankee Girl* mine in Red Canyon, San Juan County, Utah. Owned by the *Plateau Uranium Company* of Blanding, Utah, the ore comes from a vein approximately 800 feet long, 50 feet wide and between 6 and 8 feet thick. Plateau owns 141 claims in the Red Canyon district and also has 28 claims between the *Ula* and *Blue Lizard* mines. C. J. Baumgardner is president, and George O. Baumgardner, former lead-zinc mine operator in Colorado, is general superintendent of mining.

Royal Uranium Company, Inc., Salt Lake City, Utah, is shipping ore from its properties in the Indian Creek district, San Juan County, Utah. While working on its 175-foot drift to the main ore body, the company discovered an additional orebody, from which ore is being stockpiled. Chemical assays run from 0.20 to 6.0 percent U_3O_8 with an estimated overall average of 0.50 percent. George H. Patterson is president of Royal Uranium.

Lucky Strike Uranium Corporation, Salt Lake City, Utah, and Albuquerque, New Mexico, has signed a contract to purchase the *Blue Lizard* mine in San Juan County, Utah. Selling the producing mine are Donald T. Adams and Preston Redd of Monticello. Briant G. Badger is president of Lucky Strike.

The *Mountain Lion* claims, Big Indian district, San Juan County, Utah, are being drilled by *National Uranium Corporation* of Wallace, Idaho. First test hole cut about one foot of uranium mineralization at 720 feet. The claims are owned by *Silver Buckle Mining Company*, Wallace.

Continental Uranium, Inc., Chicago, Illinois, has been granted a governmental loan of approximately $34,000 through the Defense Minerals Exploration Administration for deep hole drilling on one of its Utah properties. A series of exploratory holes ranging from 300 to 700 feet in depth will be drilled on *Section 2* of the Big Indian division, a tract of 480 acres in San Juan County. Total cost of the project is estimated at $45,000.

Indian Mines, Ltd., Vancouver, British Columbia, has concluded an agreement with *Apache Uranium Corporation*, Salt Lake City, Utah, under which Apache becomes an equal partner in development of Indian Mines' *Copperhead* mine at Red Canyon, 60 miles west of Blanding, Utah.

WYOMING

Production is again underway at the *Sno-Ball* uranium claims in the Crooks Gap area of central Wyoming following their purchase by the *Lost Creek Uranium Company*, Rawlins, Wyoming, from the *Coke River Development Company*. Robert Adams, president of Lost Creek, estimates that 20,000 tons of ore are ready for shipment. More than $60,000 worth of surface ore was shipped from the claims last year by the former owners.

Intermountain Chemical Company will sink a third 1,500-foot ventilation shaft at its Westvaco, Wyoming trona mine in the near future. N. E. MacDougal is acting manager at the mine.

The *Mack-Lang Uranium Corporation*, Lander, Wyoming, has announced purchase of mineral leases to 17,920 acres in the Pumpkin Buttes area of Wyoming from the *Flanders-Langford Mining Company*. Purchase price was $89,600 with half paid in cash, the balance in stock.

L. A. Henderson, field superintendent for *Timco Uranium and Star Dust Mines, Inc.*, has announced that production has started from the uranium claims operated by the firm in the Copper Mountains area of central Wyoming. Shipments are being made to the *Atomic Energy Commission* buying station at Riverton from the open pit mine. Six additional outcroppings have been located on the property.

More than 400 tons of uranium ore averaging 0.50 percent U_3O_8 were produced from the Hope No. 9 claim in the Gas Hills area of central Wyoming during the first two weeks of operation by *Upetco* (*Utah Petroleum Company*). Ore grade will be reduced by blending to establish a shipping average of approximately 0.23 percent. An ore face of nearly 25 feet in thickness, 100 feet in width and of undetermined length has been opened up. Floor of the pit is still in ore. Primary mineral type is uraninite, and the main body is meta-autunite and autunite. There has also been a showing of carnotite. Under terms of an AEC contract, Upetco will ship 400 tons per month to the Riverton buying station. General manager is Sam Day.

The *Loma Uranium Company* has announced a program for 10,000 feet of test drilling on its uranium claims in the Gas Hills area of central Wyoming. Carl L. Lough is company president, and Ray M. Wilson, Denver, Colorado, has been named manager of operations.

Silver Dollar Mining Company, Wallace, Idaho, has acquired two sections of state land in the Wind River area near Riverton for uranium prospecting. Exploration is scheduled to get under way this month.

The *Flanders-Langford Mining Company* recently announced the purchase of uranium rights to 17,920 acres of state leased land in the Pumpkin Buttes area of northeastern Wyoming. The firm has headquarters in Houston, Texas, and recently opened field operation offices in Riverton.

Uranium ore has been found by *Timco Uranium, Inc.*, Salt Lake City, Utah, at a depth of 32 feet at the firm's *Copper Mountain* properties, Fremont County, Wyoming. Drilling operations have blocked out an ore body 25 feet wide and 100 feet long.

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PASSAIC NEW JERSEY

Moab Mines, Inc. Buys Nevada Mercury Property

Moab Mines Inc. of Moab, Utah has purchased the Black Crow mercury mine in Mineral County, Nevada. It will be operated under the direction of W. F. Jamieson, chief mining engineer. The company plans to do its own retorting at the mine, and will then ship prepared flasks directly to the government.

Known chimney-like deposits of cinnabar ore exist on the property. The mine is developed through a shaft.

Moab has a uranium mine in operation in western Colorado, and holds 114 uranium claims in Grand and San Juan counties, Utah. William J. Owen is president.

AEC Ore-Buying Station Opens at Globe, Arizona

The United States Atomic Energy Commission's new uranium ore buying station and sampling plant at Globe, Arizona, Cutter siding, is open and accepting ore. The American Smelting and Refining Company is operating the new plant for the AEC; it also operates the ore buying stations for the Commission at Monticello, White Canyon, Moab, and Marysvale, Utah; at Edgemont, South Dakota; and at Riverton, Wyoming.

Uranium-bearing ores will be received on the following terms. Uranium-bearing carnotite-type or roscoelite-type ores delivered to the station will be purchased in accordance with the prices, conditions, and specifications of Domestic Uranium Program Circular 5, Revised. These type ores containing lime ($CaCO_3$) in excess of six percent (6%) will be purchased under special contracts with individual producers, following the price schedule of Circular 5, Revised, but with appropriate deductions to compensate for the higher treatment cost of such ores.

Autunite, torbernite and uraninite ores containing less than 6% lime ($CaCO_3$) will be purchased under special contract with individual producers. Payment will be made for U_3O_8 content of the ore in accordance with the price structure as stated in Circular 5, Revised. No payment will be made for any other constituent of ores.

The Commission may from time to time issue special contracts to individual producers for the purchase of uranium-bearing ores which do not meet the specifications of the above purchase schedules. Terms of such contracts will depend upon the metallurgical characteristics of the ore.

Christmas Mine Interest Goes to Inspiration

Inspiration Consolidated Copper Company, Inspiration, Arizona, has exercised its option rights and purchased Riviera Mining Company's interest in the old Christmas mine near Winkelman, Arizona. Purchase price has not been disclosed.

The Christmas mine, located about 45 miles south of Inspiration, has been mined intermittently for the past 50 years and is reported to have produced more than 1,500,000 tons of ore averaging about 2.4 percent copper. In 1953 a new organization, Riviera Mines Company headed by W. L. Allison of the Allison Steel Company, Phoenix, optioned the mine and launched an exploration and development program which attracted the attention of Inspiration Consolidated Copper Company. Under an agreement signed February 1, 1954, Inspiration was granted an 18 months' option to acquire by assignment Riviera's lease and purchase option on the Christmas mine.

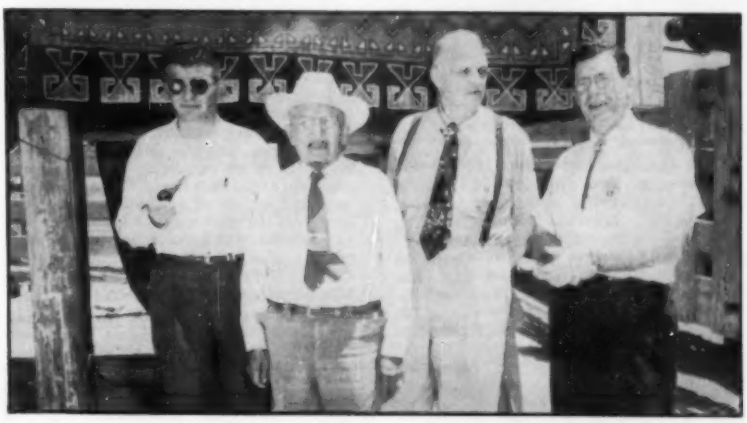
According to Richard S. Newlin, Inspiration president, his company's interest in the property lay not alone in a known body of some 300,000 tons of about 3.5 per cent copper ore between the 800-foot and 900-foot levels. It also stemmed from the possibility that substantial tonnages of ore might be developed at depth or in adjacent areas associated with the geological structures in which the known ore had been found.

An intensive development program of underground drifting and diamond drilling, both underground and from the surface, was started immediately. This work, Newlin said, had confirmed the theories regarding the presence of ore, both near and far below the limit of present workings. Inspiration also has optioned the claims owned by the New Year Mining Company lying to the west of the Christmas property in the belief that the favorable geologic structure underlying the Christmas mine extends through this property. Preliminary geological studies have been made and other exploratory work will be undertaken later.

Cost of exploration and development work up to March of this year was reported as $345,362. It consisted of 10,458 feet of diamond drilling underground and 9,418 feet of drilling from the surface, and 4,035 feet of crosscuts driven on the eighth and ninth levels of the mine.

Uranium Enterprises of America, Inc. has optioned a group of 154 lode and 15 placer claims, about 50 miles northwest of Phoenix, Arizona, from Kenneth H. James and Gene Doyle. According to Max Ingalls of Salt Lake City, president of Uranium Enterprises, exploration work will be undertaken to determine whether the property contains commercial deposits of lithium and rare earths. Roads are presently under construction. Mr. Ingalls says that he is working with another company, which he declined to identify, on a new metallurgical process to extract lithium and rare earths, with recovery of uranium and thorium as side products.

Sale of uranium prospecting permits on two units of land on the Fort Apache Indian Reservation brought a total of $43,613.43 into tribal coffers recently. *Atomic Ores Incorporated* of Globe, Arizona, was successful bidder on Unit No. 1 paying $13,062.93 for the right to prospect for one year on 19,723 acres in the southwest corner of the reservation. *Frost Geophysical Corporation* of Albuquerque, New Mexico, paid $30,550.50 for prospecting rights for one year on Unit No. 3, comprising 24,169 acres, lying in Navajo and Gila counties along the reservation's west central boundary. No bids were received on Unit No. 2, an area of 41,308 acres situated between Units Nos. 1 and 3. The prospecting permits carry with them the right to select a lease or leases on not to exceed 1920 acres in each unit. The successful bid-



Shiprock Plant Officially Dedicated

Kerr-McGee Oil Industries Inc. formally dedicated its new $3,000,000 uranium mill on June 18 at a colorful ceremony and barbecue at Shiprock, New Mexico. The plant has been in operation since November, and the first technical description of its operation was published in MINING WORLD, July 1955, pages 46-50. Kerr-McGee has been the first oil company to enter the uranium processing field. Custom ores from the surrounding Arizona-New Mexico area, as well as ore mined at Kerr-McGee's own deposits in the Lukachukai Mountains in northeastern Arizona are treated by the acid-cure method at the Shiprock mill. The plant was built on ground leased from the Navajo Indians, and about 100 of the plant's workers are Navajos. Speakers at the ceremony, shown in the picture above, include Sheldon P. Wimpfen, manager Grand Junction Operations Office of the U.S. Atomic Energy Commission; Paul Jones, chairman of the Navajo Tribal Council; Senator Robert S. Kerr, chairman of the board of directors, Kerr-McGee Oil Industries; and Dean A. McGee, president of Kerr-McGee. It has been estimated that between 2,000 and 3,000 people attended the open house and barbecue. Mr. Jones served as interpreter for many of the Navajo Indians who do not speak English.

ders have indicated their intention to explore the units fully and to develop any uranium ores found in commercial quantities. As a result of the interest shown in this sale, it is probable that additional tribal lands on the Fort Apache Reservation, as well as areas on the adjoining San Carlos Apache Reservation, may be offered for prospecting and leasing. Information concerning uranium prospecting and leasing on these reservations may be obtained by writing John O. Crow, superintendent of the Fort Apache Reservation, at Whiteriver, Arizona, or Thomas H. Dodge, superintendent of the San Carlos Reservation, at San Carlos, Arizona.

The *American Copper and Uranium Corporation* has purchased the Anton H. Miller property seven miles northeast of Globe, Arizona. Three carloads of copper ore were shipped to the *International Smelting and Refining Company* during June, the ore being mined at an open-pit following stripping operations handled by the *Mercer-Leech Construction Company of Globe*. The company is also mining silver ore from an open cut into the mountainside, and plans exploration work on uranium showings in another section of the property. Officers of the firm include Noel D. Pennington, president, San Carlos, California; Woodrow Wilson, vice president, San Mateo, California; Charles L. Wilson, Jr., secretary, Redwood City, California; Roger C. Long, treasurer, Redwood City. L. O. Goodman is general manager and Anton Miller is superintendent of exploration and mining.

E. M. Moores, Jr. of Phoenix, Arizona, has taken a sublease on the old *Copper Hill* mine near Globe, Arizona. He is trucking from 35 to 50 tons of ore a day from the old dumps to the *International Smelting and Refining Company* at Miami. The material is in demand because of its high silica content.

Clarence W. Via of Globe, Arizona, has taken a lease and option on the *Westlake* tungsten property south of Globe. He has started preliminary exploratory work.

The *American Exploration and Mining Company* in San Francisco, California, has taken over the old *Control* mines, near Oracle, Arizona. Diamond drilling and preliminary mapping has started.

The *Bear Canyon* asbestos deposit on the San Carlos Indian Reservation has been acquired by Jack L. Neal and associates of Globe, Arizona, under a 10-year leasing agreement with the San Carlos Tribal Council. The Bear Canyon is located about 43 road miles northeast of Globe, and ranks as about the fifth largest producer of asbestos in the Gila County area. Equipment includes a small mill which has a capacity of approximately 8 tons of mill rock per 8 hours.

Union Carbide and Carbon Corporation has applied for mineral patents to six mining claims and five mill sites in the Morgan Creek district of Inyo County, California.

The *Wah Chang Mining Corporation* at Bishop, California has received the right to buy electric power from the City of Los Angeles under a contract signed recently after 18 months of negotiation. Wah Chang had to construct approximately 12 miles of 34.5-kv transmission lines from a point near the Owens River Gorge plant No. 1 to the mine site near Benton. Only surplus power is being allocated and this may be terminated at any time that a surplus does not exist. Therefore, Wah Chang will still have its power plants on a standby basis. The power arrangement will not increase mine output but will be very economical for the company.

The *Radiation Nos. 1 to 9* uranium claims in the Erskine Creek area of Kern County, California have been optioned to L. G. Embree of Kernville, Joseph V. Cosgrove of Bakersfield, and *Embree Uranium Company* for $100,000. Owners are Frank Leibel and Evert Beatty.

Western Pacific Railroad Company, through its industrial development department, is undertaking a mineralogical survey of the territory adjacent to its tracks between Portola, California and Winnemucca, Nevada, and between Reno Junction and Reno. The survey is part of a long-range program of service to the territory, and the railroad says it has no interest in acquiring or developing any properties involved. The survey will merely appraise all of the known mineral resources in the area. Anyone desiring to provide first-hand information, may contact F.B. Stratton, Western Pacific director of industrial development, at 526 Mission Street, San Francisco.

The *China Lake Mining Company* has staked 30 uranium claims near the Haiwee Reservoir in Inyo County, California on the edge of the U.S. Naval Ordnance Test Station's restricted area. Members of the firm are Robert B. Smith, Paul Chadburn, Lee E. Dickerson, and Elliot J. Fox, all of Ridgecrest. Uranium assays of the property have been high, and this has brought a rush of prospectors into the area.

A 10-ton tungsten mill is being operated by the *Governor Mining and Milling Company* near Havilah, California, and is building two 20-ton mills nearby. The company plans a 24-hour operation on this ranch property owned by Mr. and Mrs. Edward Sinks. A dam has been built near the mill and water is pumped into huge tanks for use in milling. The mill treats custom ore, as well as ore from company mines.

Mt. Wheeler Mines Inc. has negotiated a contract with *Central Development Company* of Eureka, Utah to drive a 6,000-foot tunnel into its property at the foot of Mt. Washington, White Pine County, Nevada. The tunnel is expected to cut the St. Lawrence fissure and the *Combined Metals Reduction Company* bed at depth. It is also expected to supply some water, and to serve as a drainage tunnel for the *Minerva* operations.

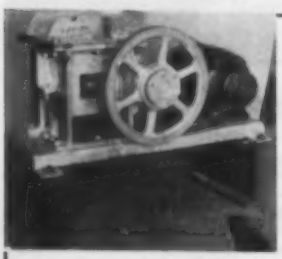
Keith Hodson of Winnemucca, Nevada is drifting on a streak of opalized wood containing precious opal in the *Rainbow Ridge* mine near Denio, north of Gerlach, Nevada. The mine was started in 1909 and has been producing gem opals since then. In June 1952, Mr. Hodson mined the world's largest precious opal weighing approximately seven pounds. This stone is currently for sale.

Uranium Enterprises, Inc., the management corporation for the *Thornburg interests*, is reported to have signed a contract with Major Nick Grieco and Joe Viani regarding their uranium properties in the Hawthorne, Nevada area. The property is known as the *Old Virginia City* group, and will be diamond drilled shortly.

Jack Jones and the Zilkie brothers of Winnemuca, Nevada are developing the *Snowbird* claims on Hot Springs Peak north of Winnemucca. The property is leased from Dr. Calder, reportedly for $100,000. They are presently developing veins of rich cinnabar occurring principally in limestone and greenstone in a fault zone. They have completed 30 feet of crosscut through the fault zone.

A.L. Ruggles is reported to have discovered a uranium deposit in Telegraph Canyon northeast of Ely, Nevada and is currently developing the property. He has sunk a 25-foot shaft on the vein and expects to continue sinking until he reaches the water level where he hopes to find pitchblende. His present ore is autunite and torbernite.

Production reportedly has started at the *Tungstonia* property of *Strategic Minerals, Inc.*, 90 miles northeast of Ely, Nevada. The firm has entered into an operating agreement with *Helmar Enterprises, Inc.* who are now operating the mine and mill and are shipping the tungsten concentrate 256 miles to Salt Lake City, Utah. William H. Weston of



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Wyoming was recently elected president of Strategic Minerals, and Harold Kentta, vice president.

Southwest Minerals Company has been formed to develop uranium, talc, and tungsten claims in the Palmetto mining district of Nevada. Bulldozers, skip-loaders and other equipment have already been delivered and are operating on the properties. Etxensive work is being planned for the development of these deposits on a large-scale, with each to be operated on a separate basis. Some of the claims and mines were purchased outright, on a bond and lease basis, and were secured by J. S. Wisdom of Dyer, Nevada. Final arrangements were made by Grover Kihorny of Glendale, California.

A uranium deposit has been reported on the *Silver Bell* property near Mina, Nevada. *Nevada Consolidated Uranium Company*, headed by William J. Graham, Sam Potter, and R. W. Van Duzen, has taken over its development. Discoverers of the deposit were James D. Gish, and Frank A. Notterman, both of Mina, and Dr. Milo of Vallejo, California.

The *H. W. Gould Company* recently purchased the *Castle Peak* mine, a well known mercury mine 10 miles north of Virginia City, Nevada. The ore is trucked to the Reilly mill in Silver City (about 12 miles) for treatment. Castle Peak has been a large producer in the past. Discovered in 1927, over 2,500 flasks of mercury were mined prior to 1943. Workings are both underground and open pit with over 3,000 feet of drifts and crosscuts. Average of the ore mined was 8.7 pounds of quicksilver to the ton.

Kennecott Copper Corporation has formed a new department in its Nevada Mines Division for the express purpose of determining ways and means of extracting more copper from Nevada ores. Donald R. Gunther, recently transferred from Kennecott's Chino Mines Division in New Mexico, will be in charge.

NEW MEXICO

First uranium ore from the Tucumcari area in northeastern New Mexico went to the Anaconda mill at Grants, New Mexico in mid-June. It came from an operation of *Standard Uranium Company* of Colorado with J. C. Mosely in charge.

The Dunn Brothers of Dallas, Texas are preparing to sink the first deep shaft for uranium in New Mexico. They are planning a 400-foot, three-compartment shaft at Ambrosio Lake in McKinley County. Peabody & Fraka are the contractors.

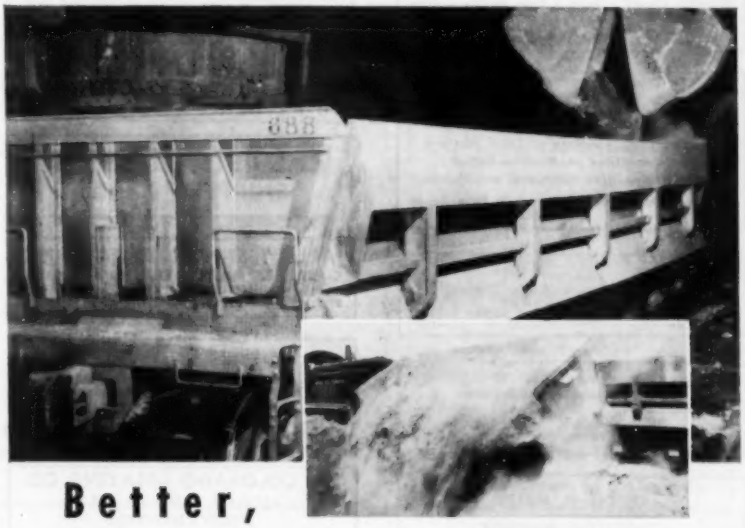
Peru Mining Company will reopen its Peru mill near Deming, New Mexico. Closed for 2½ years, the mill will now treat ore from the *Shannon* mine of *Shannon Mining Company* at Gleason, Arizona. Shannon is an affiliate of Peru.

Mid-Continent Uranium Corporation of Grand Junction, Colorado has acquired all of the Grants, New Mexico property of *All States Uranium Corporation* in a $5,000,000 transaction. The properties cover 4,000 acres 15 miles northwest of Grants, and include a blocked out ore body in one 20-acre tract. Development work on the ore body is expected to start soon. Present plans call for a 225-foot vertical shaft, with mining to be done by slushers on a retreating system.

Flanders Mining Company has acquired a five-year lease on 15,577 acres of state land in the potash area of Eddy County, New Mexico. The firm has also applied for federal permits on 75,000 acres of land in the same area. In the northern part of New Mexico in Rio Arriba County, Flanders has, in addition, applied for prospecting permits on 50,000 acres of Spanish Land Grant land. The area will be explored primarily for uranium. With offices in Grand Junction, Colorado, and Palo Alto, California, Flanders is currently engaged in active prospecting for uranium in Wyoming, Utah, and Colorado. General partners are Frederick L. Anderson, Lee Van Atta, and H. L. Slagel.

The laboratory division of *Chapman & Wood*, mining engineers of Albuquerque, New Mexico, has been approved by the AEC as umpire analyst for uranium and vanadium ores. They qualified by assaying standard samples.

Ray Burch and Raymond Hogan of Lubbock, Texas have located commercial quantities of beryl near Cordova, New Mexico which have been assayed at 13 percent pure beryllium. The partners are currently producing from their *Rocking Chair* claim, one of 17 claims, with a jackhammer and air compressor, blasting when necessary. The famous *Harding* mine which has produced beryl for many years is only 12 miles from the property.



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1—173 CFM Ingersoll-Rand, 9" x 8"
1—179 CFM Ingersoll-Rand, 12" x 10"
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1—8" x 36" Universal Jaw Crusher
1—11" x 18" Universal Jaw Crusher
1—24" x 12" Farrell Jaw Crusher
1—10" x 16" Herculos Jaw Crusher
1—10" x 16" Universal #3M Jaw Crusher
1—20" x 36" Austin- Western Jaw Crusher
1—36" x 48" Jeffrey Flextooth Crusher
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4—Rotary Kilns 7' x 60', 5' x 30', 10' 6" x 105'

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2—32"x36" Edison
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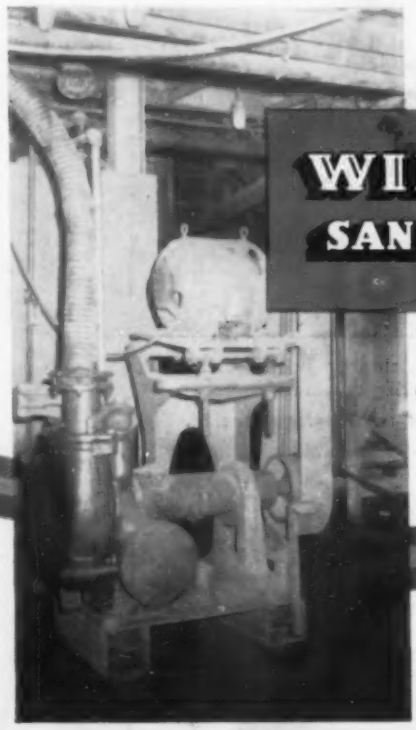

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